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Table of Contents

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ORIGINAL ARTICLES— PAGE.

"Tuberculosis in Childhood: The Incidence of Bovine Infection in Victoria", by REGINALD WEBSTER, M.D., D.Sc. 315
"Puerperal Hæmorrhage", by P. L. HIPSLEY, M.D., F.R.A.C.S. 320
"Some Operations on the Frontal Sinus", by E. P. BLASHKI, M.C., M.B., Ch.M. 323
"Palliation and X Radiation", by A. T. NISBET, M.B., Ch.M., D.P.H. 327

REPORTS OF CASES—

"Subacute Bacterial Endocarditis", by GEOFFREY A. PENINGTON, M.D. 329
"Three Cases of Supposed Early Tetanus", by MARY C. DE GARIS, M.D., B.S. 332

REVIEWS—

A Book for Obstetric Nurses 333
Retinal Detachment 333
The Stomach and Its Acidity 333
Gonorrhœa 333
Human Physiology 334
The Mentally Deficient and Their Nursing 334

LEADING ARTICLES—

Radium and Cancer 335

CURRENT COMMENT—

Meningococcæmia 336

ABSTRACTS FROM CURRENT MEDICAL LITERATURE—

Radiology 338
Physical Therapy 339

SPECIAL ARTICLES ON AIDS TO DIAGNOSIS— PAGE.

The Clinical Significance of Laboratory Tests in the Diagnosis of Hydatid Disease 340

BRITISH MEDICAL ASSOCIATION NEWS—

Scientific 342
Nominations and Elections 342

MEDICAL SOCIETIES—

Public Medical Officers' Association of New South Wales 342

CORRESPONDENCE—

Trauma and Organic Visceral Disease 344
Orally Administered Insulin 345
Two Interesting Cases 345

OBITUARY—

Gilbert Miller Teague 345
Hubert James Orr 346

BOOKS RECEIVED 346

DIARY FOR THE MONTH 346

MEDICAL APPOINTMENTS 346

MEDICAL APPOINTMENTS VACANT, ETC. 346

MEDICAL APPOINTMENTS: IMPORTANT NOTICE 346

EDITORIAL NOTICES 346

TUBERCULOSIS IN CHILDHOOD: THE INCIDENCE OF BOVINE INFECTION IN VICTORIA.[1]

By REGINALD WEBSTER, M.D., D.Sc. (Melbourne),
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As far as can be gathered from the "Report on Bovine Tuberculosis in Man and Animals in Australia"[1] issued by the Commonwealth Department of Health, the only studies of the relative incidence of human and bovine tuberculous infections in childhood in this country are those of Dr. W. J. Penfold, published by him in the "Transactions of the Australasian Medical Congress (British Medical Association)", November, 1923.[2] With the work which formed the basis of Dr. Penfold's paper I was associated to the extent of sending him all the material upon which his findings with regard to the comparative frequency of human and bovine tuberculosis in childhood were based. To the 60 cultures of *Bacillus tuberculosis* recovered from children and classified with respect to human or bovine type by Penfold, I now propose to add a report on 86 further cultures, obtained from 81 children, all, as were those investigated by Dr. Penfold, patients of the Children's Hospital, Melbourne. Incidental to the main line of investigation five cultures, obtained from bone and joint tuberculosis in adults, were examined with respect to their human or bovine character.

[1] Read at a meeting of the Melbourne Pædiatric Society on October 14, 1931.

Material Investigated.

The material utilized comprised specimens representative of tuberculosis of (1) bones and joints, (2) cervical glands and tonsils, (3) bronchial glands and lung tissue, (4) mesenteric glands, (5) brain and meninges (cerebro-spinal fluid).

Groups (1) and (2) were all operative specimens (biopsies), Group (3) necessarily all *post mortem* specimens. One of the four specimens comprising Group (4) was removed operatively, the other three

having been obtained *post mortem* from children who had died of abdominal tuberculosis. In Group (5) direct cultures of tubercle bacilli were raised from the cerebro-spinal fluid of children who in the meantime died of tuberculous meningitis.

It may be stated at the outset that a conspicuous feature of the findings was that the bovine bacillus was limited to Groups (2) and (4); in not a single specimen other than cervical glands, tonsils, or mesenteric glands, did the bovine bacillus appear.

Technique.

Direct cultures of tubercle bacilli were raised on the Dorset egg media, plain and with the addition of glycerin, from 13 samples of material of 34 in which direct cultivation was attempted. Direct cultures, however, were not made as a matter of routine, but were undertaken only when the conditions seemed favourable, in other words, when there seemed to be little probability of the cultures being overgrown during their long incubation by contaminating organisms. Generally speaking, no reliance was placed on direct cultures from such specimens as *post mortem* tissues and tonsils, both of which were likely to furnish a profusion of contaminants.

The routine followed for the recovery of the tubercle bacillus, whether or not direct cultures had been made, was to inoculate a guinea-pig and culture on the Dorset media from the lesions in the animal. Tissues such as tonsils, and bronchial glands and lung tissue of *post mortem* origin, were first subjected to the antiformin process. "Clean" material, such as the caseating contents of freshly opened cervical glands, joint fluids, pus from cold abscesses, was mixed with saline solution and injected into the guinea-pig without any preliminary antiformin treatment.

In the guinea-pig inoculation test the subcutaneous method was employed exclusively, its particular advantage being that the development and softening of a nodule at the site of injection could be watched and the animal killed when the local lesion was considered in favourable condition for cultures to be obtained. Tubercle bacilli were invariably to be found in the softened nodule, or, if sloughing had occurred, as sometimes happened, in the related inguinal glands. Cultures could be made cleanly from the easily accessible subcutaneous nodule, and by killing the guinea-pig as soon as softening was apparent in the lesion at the site of injection, weeks and months of waiting for the animal to die were obviated.

Cultures from the lesion in the guinea-pig were made on the Dorset egg and glycerin-egg media. The striking contrast between the profuse, verrucose, pigmented growth of the "eugonic" human strain, its characteristics developed to a maximum on the glycerine media, and the scanty, flat, non-pigmented "dysgonic" bovine strain, its growth retarded or perhaps inhibited by the presence of glycerin, enabled a provisional identification with respect to type to be made without difficulty in the vast majority of instances. In the few in which the cultural characteristics appeared to be equivocal the virulence test in the rabbit determined the issue.

The foregoing statement is not to be taken as implying that virulence tests in rabbits were reserved for those strains of doubtful cultural characteristics. The pathogenicity of the strain for the rabbit was made a fundamental requirement and was determined with respect to all the cultures of *Bacillus tuberculosis* considered in this paper.

The technique employed to determine virulence in the rabbit was to prepare an emulsion of the strain under investigation of about the same density as that of a staphylococcus emulsion containing 250 million organisms per cubic centimetre. The rabbit was then anæsthetized with ether, one cubic centimetre of the tubercle bacillary emulsion taken into a five cubic centimetre syringe, and with the syringe thus charged, blood was aspirated from the heart of the rabbit. As soon as the blood rushed into the barrel of the syringe it was returned to the heart, with the emulsion of tubercle bacilli with which it had mixed.

Using this technique of intracardiac injection, adopted on account of the extreme difficulty of injecting the ear veins of the Australian rabbits which I employed, I experienced no fatalities from air embolus or hæmopericardium.

With the virulence test carried out in the manner indicated, bovine strains induced fatal disseminated tuberculosis in the rabbit in eleven to fourteen days. It was exceptional for the rabbit to live longer than fourteen days, although one animal, inoculated with tubercle bacilli culturally bovine, lasted for twenty-three days. That death was due to disseminated tuberculosis was confirmed in every instance by *post mortem* examination of the rabbit, and it was noted that those dying at eleven to fourteen days invariably showed extremely heavy dissemination.

Rabbits inoculated in the manner described with strains culturally human lived for an indefinite number of weeks. After the work had been in progress for some time the practice of killing these animals at the end of six weeks was adopted. It was generally found that a local tuberculous lesion was present in the pericardium, and as a rule miliary tubercles would be found in the lungs and kidneys. The degree of dissemination, however, after six weeks, was not comparable with that which killed the bovine rabbits in fourteen days.

Discussion of Results.

Group (1): *Bone and Joint Tuberculosis.*

In Group (1) are included 22 children and five adults. In every instance the culture of *Bacillus tuberculosis* recovered was of human type. The affected bones and joints were as follows:

Children (22):	Vertebræ	8
	Hip joint	3
	Knee joint	3
	Ankle joint	2
	Tarsus	2
	Phalanx (digit)	2
	Shoulder joint	1
	Sacro-iliac joint	1
Adults (5):	Vertebra	1
	Hip joint	1
	Knee joint	1
	Wrist joint	1
	Ischium	1

As indicated, the findings with regard to bone and joint tuberculosis were 100% human type. In the material sent to Dr. Penfold from the Children's Hospital, Melbourne, in 1922-1923, there were four specimens in this class—one of the products of tuberculous caries of the vertebræ and three of "cold abscess" material derived from tuberculosis of the hip joint. The infecting tubercle bacillus in each of these four instances of bone and joint tuberculosis was identified by Dr. Penfold as of human type.[2]

Among 31 subjects of bone and joint tuberculosis, therefore (26 children and five adults), investigated in Melbourne, not a single instance of bovine infection occurred. In my own series of 22 children, 10 were under five years of age, the first five years of life being generally considered as the period of maximum exposure to bovine infection. In 11 of the 22 there was a definite and unequivocal history of intimate contact with pulmonary tuberculosis, but in the remaining 11 there appeared to be no pulmonary tuberculosis in the child's family and the source of infection could not be traced.

Although the Australian observations on the type of tubercle bacillus responsible for bone and joint tuberculosis, appear to be limited to 31 investigated cases (Penfold 4,[2] Webster 27), all of which were shown to be human infections, it would, I think, have been anticipated by many that at least a few bovine infections would have occurred among this number. There is certainly a widespread impression that the bovine bacillus plays a considerable part in tuberculosis of the bones and joints in childhood, but the findings above recorded indicate that in this clinical group the bovine bacillus is at most a small factor.

Donald Paterson[3] in his recent book "Sick Children: Diagnosis and Treatment" makes the statement in connexion with bone tuberculosis that:

> Undoubtedly the bovine infection is much more frequently responsible than the human type, and bone tuberculosis is actually more prevalent in districts where the milk supply is infected.

This statement, of course, is to be read as applicable to Great Britain, but the first sentence is at variance with the findings of A. S. Griffith,[4] who published a comprehensive review of 598 cases of bone and joint tuberculosis in Great Britain, in which the type of infecting bacillus had been determined. The examinations had been made by the Royal Commission, Eastwood and F. Griffith, and the author himself. In this large series the bovine bacillus was implicated in 20·5% of the total, the human bacillus being responsible for the remainder. Under the age of five years the proportion of bovine infections was 32·8%, from five to ten years, 24·5%; in subsequent age groups the incidence of bovine infections fell rapidly and no patient over twenty-three years of age yielded the bovine bacillus.

It would be unsound of course to draw a general conclusion regarding the amount of bone and joint tuberculosis occasioned by the bovine tubercle bacillus in Australia from the relatively small number of cases in which the necessary bacteriological examinations have been made, but from the findings here recorded the suggestion arises that tuberculosis of bones and joints among children in this country is to be traced much more frequently to human than to bovine sources of infection.

Group (2): Cervical Glands and Tonsils.

The findings in Group (2) may be tabulated as in Table I.

TABLE I.

Material.	Bovine.	Human.	Percentage Bovine.
Cervical glands ..	17	7	70·8
Tonsils	4	3	57·1

It was in this group that the majority of the bovine strains identified occurred, and the figures are in striking contrast with those obtained in Group (1): bones and joints (100% human), and Group (3): bronchial glands and lung tissue (100% human).

It might perhaps be repeated here that in all the 86 cultures of *Bacillus tuberculosis* examined from children under fourteen years of age, not a single bovine strain was encountered outside the cervical and mesenteric glands. The cervical gland group properly includes the tonsils.

Seven cultures of tubercle bacilli obtained from the tonsils were examined and classified as four bovine and three human. Every child whose tonsils were so examined, was the subject of tuberculous cervical adenitis, and in five instances identical types of tubercle bacilli were recovered from the cervical glands and tonsils in the same child. From the other two children whose tonsils yielded *Bacillus tuberculosis* in culture after passage through a guinea-pig, no material was received from the cervical glands.

Of the seven children from whom the human type of *Bacillus tuberculosis* was recovered from the cervical glands, two only appeared to have come from tuberculous households, the father of one child and the mother of the other being subjects of pulmonary tuberculosis. In one child only of the seventeen in whom the tuberculous cervical adenitis was shown to be of bovine origin, was there any family history of tuberculosis, and in this instance the child's mother was stated to be tuberculous. In view of this circumstance the cultures from the child's cervical glands were examined very rigidly and the virulence of the strain established in two rabbits.

The age incidence of human and bovine tuberculous infection in cervical adenitis, is shown in Table II.

TABLE II.[1]

Type.	Age Period.												
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13
Human ..	–	1	2	–	2	1	1	1	1	–	–	–	–
Bovine ..	1	2	3	1	1	–	5	–	–	1	1	1	1
Total ..	8 bovine, 5 human					6 bovine, 4 human.					3 bovine.		

[1] The table includes two strains recovered from tonsils only. In the remaining five children from whom *Bacillus tuberculosis* was recovered and classified from the tonsils, a culture was obtained from the cervical glands as well. These five are included in the table as cervical gland cultures.

Although in general the findings of other workers indicate a maximum incidence of bovine infections during the first five years of life, and such would be a strong presumption in view of the dominating influence of milk in the diet in infancy and early childhood, the above table does not show a very striking predominance of bovine infections during the first five years (8 bovine : 5 human) as compared with the second five-year period (6 bovine : 5 human). Admittedly the figures are small. Penfold[2] did not record a single instance of bovine infection in children who had passed the age of four years, but his experience in this particular is no doubt to be explained by the fact that the number of successful cultivations of tubercle bacilli from the cervical glands was very few—three only among twelve samples of material from clinically tuberculous cervical glands.

Dr. Penfold commented in his paper[2] on the fact that of 12 specimens of cervical glands removed operatively as clinically tuberculous, no less than nine failed to yield tubercle bacilli on animal inoculation, and further remarked that in three of the nine non-infective specimens acid-fast bacilli were found in direct smears of the caseous contents of the glands. He suggested that either such acid-fast bacilli were dead, or they represented acid-fast bacilli other than *Bacillus tuberculosis*, non-viable on Dorset's medium, and investigated them with negative findings as being possibly examples of Johne's bacillus, an organism known to infect cattle in Victoria.

In the present investigation, 40 specimens from cervical glands were examined altogether. In 24, inoculation of guinea-pigs was successful, *Bacillus tuberculosis* was recovered and identified as to type. With the remaining 16 specimens the attempt to communicate tuberculosis to guinea-pigs failed, despite the fact that five of them showed acid-fast bacilli in direct smears from the softened centres of the glands.

In spite of the failure of the animal tests, I consider that the great majority of the 16 children from whom these specimens were removed as tuberculous on clinical grounds, were correctly diagnosed. In six of the 16, although the guinea-pig inoculation test failed, pathological confirmation of tuberculosis was forthcoming in other directions. The glands of four of the children, for instance, provided the typical histology of tuberculosis in microscopical sections, while one, who showed acid-fast bacilli in the detritus from the cervical glands (non-infective to a guinea-pig), showed the histological lesions of tuberculosis in the tonsil on the same side as the affected glands. The sixth child was very interesting. Although the caseating cervical glands proved non-infective to a guinea-pig, the glands were tuberculous by section, and further, tuberculosis was communicated to a guinea-pig from this child's tonsils, removed at the same time as the glands.

The remaining ten specimens were products of aspiration and consequently provided no opportunity to confirm the clinical diagnosis by histological section.

With regard to the failure of the guinea-pig inoculation test with specimens such as those under discussion, removed from children exhibiting clinically tuberculous cervical glands and even showing acid-fast bacilli, I would consider that the explanation of the results lies with much greater probability in the fallibility of the inoculation test than in the view that the clinical diagnosis is erroneous. As has already been shown, some specimens which fail to infect guinea-pigs can be proved tuberculous by other methods. Also, I have known the guinea-pig inoculation test fail under circumstances which left no room for doubt regarding the tuberculous nature of the material inoculated, the experience occurring twice with bronchial glands obtained *post mortem*. In both instances the inoculum showed acid-fast bacilli in smears; both children from whom the glands were obtained died of disseminated tuberculosis, but the guinea-pigs were resistant.

In the investigation of any considerable number of tuberculous specimens I would always be prepared for a proportion of negative inoculation results and in fact would not anticipate the infection of the guinea-pig from a specimen showing decided fibrotic changes and dry, crumbly caseation dotted with calcareous spicules—conditions which are very prone to occur in tuberculous cervical and mesenteric glands.

A. S. Griffith,[4] in investigating a series of 147 cases of bone and joint tuberculosis, noted that the material from 13 patients, all clinically tuberculous, failed to infect guinea-pigs, although in two of the specimens acid-fast bacilli were demonstrated in smears.

Group (3) : Bronchial Glands and Lung Tissue.

In Group (3) of the 27 cultures of *Bacillus tuberculosis* recovered from bronchial glands and pulmonary tissue, examined culturally and by virulence to rabbits, all were of the human type—classical eugonic strains of low virulence to rabbits. All the children from whom these *post mortem* specimens were obtained, died of disseminated tuberculosis, and the autopsy findings were indicative of a respiratory mode of infection. As noted above, there were two failures in this group, the attempt to cultivate tubercle bacilli being defeated by the failure of the guinea-pig inoculation. The majority were very young children, 16 of 27 from whom cultures were obtained being under two years of age.

It was anticipated that human strains would predominate in this group, respiratory tuberculosis of bovine origin being very uncommon. W. T. Munro[5] reported the recovery of bovine bacilli from the sputa of 10 patients in the course of seven years at the Fife and Kinross (Glenlomond) Sanatorium and remarked that the recovery of the bovine tubercle bacillus from the sputum was sufficiently rare to command attention. While this is so, it would not have been surprising to have met bovine bacilli in the bronchial glands, as it is a generally accepted view that these glands may become involved secondarily from the mesenteric glands. Such was the experience of Penfold, who, in the paper[2] to which reference has been made, recorded two bovine and nine human strains recovered from *post mortem* specimens of bronchial glands. The same observer,

reporting on 70 strains of the tubercle bacillus isolated from adults and in almost every instance from the sputum, found all to be human in character.[2]

In 71 samples of sputum examined in the Health Laboratories of the Commonwealth Department of Health[1] in the several States during the period 1924-1928, the human tubercle bacillus was identified in every instance.

Group (4): Mesenteric Glands.

Very few specimens of mesenteric glands were received in the course of the two years during which the work was in progress. Five abdominal lymphatic glands were examined and *Bacillus tuberculosis* cultivated from four of them. All were indubitably bovine in character. All the children from whom mesenteric glands were received, were very young, the age of the oldest being four years and three months. Three of the glands from which a bovine strain of *Bacillus tuberculosis* was recovered were *post mortem* specimens, and in each case the affection of the mesenteric glands was associated with tuberculous ulceration of the ileum and a varying degree of tuberculous peritonitis.

Group (5): Brain and Meninges.

This small group, Group (5), comprised two specimens of cerebro-spinal fluid in which *Bacillus tuberculosis* was cultivated directly from the centrifuged deposits on the Dorset egg media. Both cultures were definitely of human type as judged by the criteria required throughout the investigation.

The foregoing results are perhaps best presented in the form of a table which correlates the human and bovine strains recovered with the source of the material (Table III).

TABLE III.
Source of Material.

Type	Biopsies.						Autopsies.			
	Tonsils.	Glands.		Bones	Joints	Cerebro-spinal fluid	Glands.		Lung.	Total.[1]
		Cervical.	Mesenteric.				Bronchial.	Mesenteric.		
Human	3	7	—	12	10	2	21	—	6	61
Bovine	4	17	1	—	—	—	—	3	—	25

[1] Total 86. In addition, five cultures from bone and joint tuberculosis in adults, all of human type.

In arriving at an estimate of the relative incidence of human and bovine infection in childhood as indicated in Table III, allowance must be made for the fact that in five children, cultures were obtained from both tonsils and cervical glands. Four of the strains were bovine and one human, and in each case the culture from one source duplicated that from the other. It would therefore be more correct to regard the total number of infections as 81, of which 21 were bovine and 60 human.

The incidence of bovine infection among 81 children up to the age of fourteen years, exhibiting varied clinical manifestations of tuberculosis, was thus 21:81, or 25·9%.

The results obtained regarding the incidence of bovine tuberculous infection in the different bodily tissues may also be presented as in Table IV.

TABLE IV.

Tissues.	Human.	Bovine.	Percentage Bovine.
Bones and joints	22	0	0
Bronchial glands and lung ..	27	0	0
Cervical glands and tonsils ..	10	21	67·7
Mesenteric glands	0	4	100
Brain and meninges	2	0	—

A further table is designed to show the incidence of bovine infection at different age periods from earliest infancy to fourteen years (Table V).

In the first five years of life the number of bovine infections was 12, as compared with 37 human infections during the same age period—a percentage incidence of bovine infections of 24·4. In the older children, from five to fourteen years of age, nine bovine infections and 23 human infections occurred—a percentage incidence of bovine infection of 28·1.

It has usually been found that the incidence of bovine infection is higher during the first five years of life than at later periods, but the nature of the material examined, at least as much as the age of the child, determines the expectancy or otherwise of a bovine strain. It will be noted that the largest single age group in the above table is that under one year. In this group the material used was bronchial gland and lung tissue secured from infants who had died rapidly of disseminated tuberculosis. The inclusion of a relatively large number of specimens of the nature and from the source indicated, operated in the direction of swelling the number of human strains recovered. Similarly, the bovine figures could be raised by allowing cervical glands and tonsils to preponderate in the material examined. Throughout the investigation the specimens were taken as they came and no selection of material was exercised.

TABLE V.
Age Incidence of Bovine Infection.

Type.	Age Period.														Totals.
	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	
Human ..	14	4	7	7	5	4	5	2	4	2	1	1	1	3	60
Bovine ..	1	3	4	2	2	0	5	0	0	1	1	1	1	0	21

Summary.

1. The results of the investigation of 81 children with varied manifestations of tuberculosis, and five adults with bone and joint tuberculosis are presented.
2. Bone and joint tuberculosis, bronchial gland and lung tuberculosis and tuberculosis of the brain and meninges were found to be due invariably to the human type of *Bacillus tuberculosis*.
3. Tuberculosis of cervical glands and tonsils was shown to be of bovine origin to a predominating extent, the number of bovine infections in a series of 24 cervical glands being 17 (70·8%).
4. The small number of mesenteric glands examined all yielded the bovine type of *Bacillus tuberculosis*.
5. In no case was the bovine bacillus encountered outside the tonsils, cervical, or mesenteric glands.
6. A discussion is included on the not infrequent failure of the guinea-pig inoculation test for the recovery of *Bacillus tuberculosis*.

References.

(1) M. J. Holmes and W. A. N. Robertson: "Report on Bovine Tuberculosis in Man and Animals in Australia", Commonwealth Department of Health, 1930.
(2) W. J. Penfold: "Types of Tubercle Bacilli Prevailing in Australia", "Transactions of the Australasian Medical Congress (British Medical Association), 1923, page 261 (Supplement to THE MEDICAL JOURNAL OF AUSTRALIA, May 3, 1924).
(3) Donald Paterson: "Sick Children: Diagnosis and Treatment", 1930, page 436.
(4) A. Stanley Griffith: "The Types of Tubercle Bacilli in Human Bone and Joint Tuberculosis", *Journal of Pathology and Bacteriology*, October, 1928, page 875.
(5) W. T. Munro, *The British Medical Journal*, May 4, 1929, page 813.

PUERPERAL HÆMORRHAGE.[1]

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I HAVE found it somewhat difficult to choose a subject upon which to address you, as I recognize that you are all familiar with most of the common complications of labour, and probably know how they should be dealt with. On looking back over my own experience gained whilst in general practice, however, I can recall many interesting cases, the significance of which I did not fully comprehend at the time. With added knowledge, more light has been thrown upon certain of them, and I propose to make these rather rare conditions form the basis of my address. I shall therefore discuss the hæmorrhages that may occur in the puerperium, other than primary *post partum* hæmorrhage, the causes and treatment of which must be familiar to you all. At any rate text books deal adequately with this subject.

You may regard certain of the conditions about which I intend to speak, as unlikely to be encountered by you, because of their rarity. However, they all came under my own experience whilst in general practice, and if you stay in practice long enough, you will no doubt meet with similar cases. Unless they are recognized and treated correctly, your patient may lose her life and you your reputation.

[1] Read at a meeting of the Western Suburbs Medical Association, New South Wales, June 11, 1931.

The public expects the doctor to be able to conduct all labours so that there shall be no complications; and we all know how difficult that is, as there are certain complications, like adherent placenta, which it is impossible to foresee. Hence we must all be equipped with sufficient knowledge to be able to recognize and deal with the rare, as well as the commoner complications of labour. Since your obstetric practice forms a large part of your medical work, even rare conditions are likely to come under your care; and you will not always be able to pass the responsibility on to the specialist, even if you cared to do so. Moreover, the specialist may also make mistakes, and then you have to share the blame with him. Before dealing with the conditions which may cause hæmorrhage during the puerperium, I should like to remind you of a few facts with regard to the condition of the blood in pregnant women. The reproductive function is the only one normally attended by hæmorrhage, and a healthy pregnant woman can stand a loss of blood that might prove fatal in other women. During pregnancy the total amount of blood is increased, especially after the fifth month, and the blood fibrin is also increased. The average blood loss during labour is about eight to ten ounces, and the loss of one pint can usually be borne without serious symptoms. Very little blood is lost before the expulsion of the placenta, and after expulsion the normal loss amounts to about three ounces in the first two hours, so that any loss above these amounts may be regarded as pathological.

Puerperal hæmorrhage, sometimes called late *post partum* hæmorrhage, means hæmorrhage after the first six hours of the puerperium, although the term late is sometimes reserved for hæmorrhage after the first day. Serious hæmorrhage may occur at any stage of the puerperium, even as late as the fifth week; and even slight hæmorrhage, if continuous and prolonged, may endanger the patient's life.

Let me enumerate some of the conditions which are associated with hæmorrhage during the puerperium: Retention of placental fragments or portions of membrane; placental polypus; subinvolution; uterine displacement; sudden physical strain and nervous influences; fibroids, especially the interstitial and submucous varieties; partial or incomplete rupture of the uterus; traumatic aneurysm of the uterine artery; inversion of the uterus; puerperal septicæmia; chorion epithelioma.

Retention of placental fragments or of pieces of membrane is of course a very common cause of late hæmorrhage, as well as of primary *post partum* hæmorrhage. Pieces of membrane, however, sometimes come away as late as the tenth day without much bleeding. Indeed the lochia may be almost suppressed for some days, when pieces of membrane have been retained but not infected. At times retained and infected decidual fragments disintegrate and mix with the lochia, which then becomes profuse, red and generally offensive.

Placental polypus is caused by a deposit of fibrin occurring on a piece of retained placenta, which has not become infected. These cause irregular hæmorrhage which continues until the cause has been removed.

Subinvolution is generally associated with a low grade infection or with displacement of the uterus.

Uterine displacement, generally retroflexion, may cause bleeding which sometimes continues for weeks.

Sudden physical strain, as may occur when the patient first gets up, and nervous influences, such as sudden fright, are also said to cause hæmorrhage.

Partial or incomplete rupture of the uterus, traumatic aneurysm of the uterine artery, and inversion of the uterus, are rare causes, and I intend to deal with these more fully.

Secondary hæmorrhage after suture of a cervical tear, sometimes occurs just as it does after the similar gynæcological operation.

Puerperal septicæmia with softening of the thrombi of the placental site is a very serious cause of puerperal hæmorrhage.

Now most of us must have met with cases due to subinvolution, retention of fragments of decidua *et cetera*, and I do not intend to dwell any further on these, except to mention that placental polypus and infected placental fragments are very serious conditions. The long continued hæmorrhage saps the patient's strength, and septicæmia or pyæmia frequently follows attempts at curettage in these circumstances. Moreover, the operation of curettage itself may result in uncontrollable hæmorrhage. Let me relate a case which came under my notice recently, in which curettage resulted in death from hæmorrhage.

The patient was a young healthy *primipara*. On the third day of the puerperium, she ran a slight temperature; the lochia was heavy and free, and the uterus subinvoluted. On the seventh day her uterus was curetted under an anæsthetic. No placental fragments were found, as these had evidently disintegrated. The hæmorrhage started by the curette was excessive and uncontrollable, and all attempts to stop it, even by plugging the uterus with gauze, failed, and the patient died several hours later. The blood that came away was of a peculiar lake colour and seemed to have lost its power of clotting.

Probably also the curette had displaced softened thrombi in the uterine wall.

Curettage during the latter part of the puerperium is often attended by serious results, not only from hæmorrhage, but because a local infection may be converted into a septicæmia or pyæmia. I well remember a patient who, after curettage on the seventh day of the puerperium, developed a septic embolus of the lung, about an hour after the operation. The curette is a very dangerous instrument to use in the puerperal uterus. In addition to the dangers already mentioned such a uterus is easily perforated. I do not desire, however, to decry the use of the curette in the puerperal uterus altogether, as it has its uses; but if used at all, it should be before, rather than after infection. The late Dr. MacCulloch whose vast experience in obstetrics was unequalled in his time, always advocated the use of the fingers rather than the curette for the removal of placental *débris*; and I have no doubt that he was right. There is no question that the curette will leave the inside of the uterus much cleaner than will the fingers, but when placental fragments are infected, and when there are infected thrombi in the uterine wall, the curette is likely to do more damage than the careful removal of fragments of placenta with the fingers. When the placenta has been firmly adherent, it is practically impossible to remove all the fragments completely by hand, and I have used the curette to advantage in such cases within twleve hours of labour, that is, before there was any chance of infection.

Traumatic Aneurysm of the Uterine Artery.

Traumatic aneurysm of the uterine artery is of rare occurrence, although possibly some cases are not diagnosed. It is generally due to a laceration involving the cervix, and extending so far out as to expose the uterine artery, upon which an aneurysmal dilatation may form, and subsequently rupture spontaneously or from injury by the curette.

Before relating a case of this kind which came under my care some time ago, I should like to mention a few facts about tears of the cervix. Although a deep cervical tear usually gives rise to severe *post partum* hæmorrhage, it is possible to have a tear extending even into the broad ligament, with very little hæmorrhage, and the healing of such a tear may leave the uterine artery very near the surface. The usual cause of tears of the cervix is extraction of the child through an undilated cervix, but even after the cervix is completely dilated, laceration of the upper fibres may be produced by extraction of the child during spasmodic contraction of the lower uterine segment and upper part of the cervix. Moreover, even after the head has passed through the cervix, the contraction ring may close down around the neck of the child, and then forcible delivery may cause the shoulders to tear the edge of the contraction ring. Hence serious tears may be produced without the *accoucheur* being aware that anything serious has happened. Tears of this kind are particularly liable to happen in *placenta prævia*, because of the extreme vascularization of the cervix and lower uterine segment.

The following is a brief summary of the history of a patient who had an aneurysm of the uterine artery, which ruptured after curettage.

Mrs. H., a *multipara*, aged thirty years, was delivered of a full time child without the services of a doctor. Shortly after the placenta had been expressed, she had a fairly severe *post partum* hæmorrhage. I first saw her a couple of hours later, by which time the bleeding had ceased. On the third day of the puerperium, as the lochia was rather free, and the temperature elevated, curettage was decided upon. This was done in the patient's own home, and the only instruments I had with me were those necessary for curettage. No evidence of any external laceration of the cervix could be seen, but the scar of an old transverse tear was present. After drawing the curette a few times over the surface of the uterus, and whilst withdrawing the instrument, there was a sudden gush of blood through the os. The blood seemed to be coming from one side of the cervix and was obviously arterial in origin. The actual site of the bleeding could not be seen, but it appeared to be coming from the left uterine artery. By pulling down the cervix with a volsellum, and grasping the vault of the vagina over the region of the uterine artery with a pair of sponge forceps, I was able to control the hæmorrhage temporarily. An attempt was then made to secure the artery by ligature, passed by means of a curved needle, but several attempts to control the hæmorrhage in this way failed, and I was eventually forced to leave the sponge forceps in position, although I felt that there was a risk of damage to the ureter. After leaving the forceps on for forty-eight hours they were removed without further bleeding, except for some slight hæmorrhage which occurred about the tenth day when the slough which had been caused by the grasp of the forceps, separated.

Needless to say, rupture of an aneurysm of the uterine artery requires prompt action. Another

method of temporarily controlling this form of hæmorrhage is by compression of the aorta, until more radical means of securing the artery are adopted. Vaginal hysterectomy has been done for this condition. After the successful result of the method which I adopted, however, I have no hesitation in recommending this procedure.

Rupture of the Uterus.

Partial or incomplete rupture of the uterus probably occurs more frequently than is generally supposed. The uterus may rupture during pregnancy or labour, and the rupture may be spontaneous or traumatic. When, however, the natural forces of labour cause rupture, it is generally because the uterine wall has been weakened by disease or by previous operative interference. Traumatic rupture usually follows forceps delivery or the operation of version, when labour has been obstructed from some cause or other. Among the predisposing causes may be mentioned: scars in the uterine wall, from a previous Cæsarean section, or after the excision of fibroids; weakening of the lower uterine segment by *placenta prævia*; overstretching of the lower uterine segment from labour in cases of disproportion; malpresentation or malposition.

Mechanism of Rupture.

If during labour the presenting part cannot advance, the upper uterine segment gradually forces the greater part of the fœtus into the overstretched lower uterine segment, which becomes at times so thinned out that the outline of the fœtus can be very distinctly felt, especially if the patient is under anæsthesia. Bandl's ring in these cases may reach almost to the level of the umbilicus. When the abdomen is very pendulous and the pelvis contracted, the posterior portion of the cervix may be fixed against the pelvic brim by the presenting head, and the thinned out lower uterine segment eventually gives way. If the os is fully dilated and portion of the presenting part has passed through it, then the full force of the pull of the upper uterine segment would fall on the upper and posterior portion of the vagina, and the final rupture would then be in the posterior vaginal fornix.

In uterine rupture, the tear occurs first in the muscular layer, next in the mucosa, and finally in the peritoneum. Hence in partial tears one may have a rupture of muscle only, or of muscle and mucosa. In such cases extensive hæmorrhage may occur, the blood stripping up the peritoneum which is attached only loosely to the lower uterine segment and very little escaping externally. In these cases, when the blood has made its way between the layers of the broad ligament, one can readily feel the hæmatoma through the abdominal wall, alongside the uterus and pushing it over to the opposite side. I have seen such a case in which the blood had extended retroperitoneally as far as the kidneys.

Frequency of Rupture.

Rupture of the uterus is about eight times as common in a *multipara* as in a *primipara*, and its frequency naturally increases with the number of children a woman has had. This is worthy of note, because there is a tendency to minimize the risk of labour in a *multipara*.

Symptoms.

Complete rupture is attended by very severe shock, and by both external and internal hæmorrhage, and when these symptoms follow on obstructed labour, the diagnosis is generally easy. When the rupture is incomplete, not involving the peritoneum, its presence may not even be suspected. Hence in every labour when difficulty has been experienced in delivering the child, as after a difficult forceps delivery or after version, this complication should be excluded after careful vaginal examination. Remember that both complete and incomplete rupture may occur after an apparently normal labour.

I should like to quote two cases of rupture which have come under my notice and in which the medical attendant had failed to diagnose the condition.

A *multipara* had been in the second stage of labour for several hours, when the *accoucheur* decided to deliver her with forceps. He failed to recognize the fact that he was dealing with an occipito-posterior position, and several attempts at delivery failed, and I saw the patient in consultation. Vaginal examination revealed an extensive tear through the posterior vaginal fornix, through which the whole hand could easily be passed. After manual rotation of the head it was quite easy to deliver the woman with forceps. The rent in the vaginal vault was lightly packed with gauze, and the woman convalesced without any further complication.

The second patient was also a *multipara*, who had also been delivered with forceps. The placenta had been expressed half an hour later, accompanied by moderately severe *post partum* hæmorrhage. Several hours later she appeared paler than could be accounted for by any external loss of blood, and the pallor increased as time went on. I saw her on the second day of the puerperium, at this time her pulse was persistently over 100, her temperature normal, and a large mass was palpable through the abdominal wall, alongside the uterus, pushing it over to the opposite side. As the mass was increasing in size, an abdominal section was decided upon. It was then seen that the blood had extended upwards behind the peritoneum as far as the kidneys, and there was a large hæmatoma between the layers of the broad ligament. An attempt was made to control the bleeding after turning out the clot from the broad ligament. It was impossible to find any bleeding point and gauze packing was resorted to, but the patient subsequently died.

Since seeing this patient I have come across a similar one, but in this patient the hæmatoma was not so large and was not increasing in size. In this case operation was advised by the doctor in charge of the case, but fortunately the husband would not give his consent, and the patient gradually improved with the absorption of the hæmatoma.

Treatment of Rupture.

Prevention here as elsewhere is far better than cure. In cases of threatening rupture, if the cervix is imprisoned in the pelvis, then it must be pushed up above the head, and after correction of any malpresentation or malposition and provided there is no great disproportion, delivery with forceps can sometimes be effected; otherwise, craniotomy or embryotomy has to be done. If the child is alive, and forceps delivery out of the question, the extraperitoneal Cæsarean operation may be considered, but the transperitoneal operation is risky after rupture of the membranes.

The operation of version in these cases is of course contraindicated. There is always a risk in sending patients with threatened rupture into hospital, as the uterus may rupture on the way there.

After rupture, if the child has escaped into the abdominal cavity, apply a snug abdominal binder, and remove the patient to hospital for abdominal section. If the child is still within the uterus and it is possible to deliver with forceps, then this is the correct procedure. After delivery, light packing of the rent with gauze and drainage *per vaginam* is better treatment than laparotomy, unless there is internal hæmorrhage, when of course a section should be done. Sometimes it is advisable to close part of the tear with sutures and drain the remainder with strips of gauze or soft rubber tube.

Incomplete rupture again is best treated with light packing. Never be tempted to open the hæmatoma in the broad ligament, as was done in the case reported above.

Inversion of the Uterus.

Inversion of the uterus is admittedly rare, but still an important cause of *post partum* hæmorrhage. I have known this accident to be overlooked by the medical attendant, and subsequently by a consulting obstetrician, and the condition remain undiagnosed for a week. This form of inversion is called acute puerperal inversion, to distinguish it from the chronic inversion that occurs apart from pregnancy, as in cases due to the dragging of a submucous fibroid. In some instances the fundus only is inverted; in others the whole uterus is turned inside out; and occasionally one sees the inverted uterus prolapsed outside the vulva.

Causation.

Inversion may occur spontaneously as a result of intraabdominal pressure or from the mere weight of the intestines, but it is generally due to the forcible expulsion of the placenta whilst the uterus is in a relaxed condition. It could of course be caused by pulling on the cord, a procedure hardly likely in the practice of anyone except an ignorant midwife.

Symptoms.

As a rule inversion of the uterus is followed by alarming symptoms. There is generally considerable shock, and profuse hæmorrhage is not infrequent. The fundus disappears from above the symphysis, but the inverted uterus can of course be felt *per vaginam*.

Treatment.

If the condition is recognized immediately, replacement is usually easy. The longer the condition remains undiagnosed, the more difficult the replacement becomes. As the uterus undergoes involution in the inverted position, it soon becomes impossible to replace it, except by doing a serious operation; this may have to be delayed for a long time, on account of the exhausted condition of the patient through hæmorrhage and possibly sepsis.

Let me relate the history of a case which came under my notice some time ago.

The patient was a healthy young woman who had an apparently normal confinement after her second pregnancy. The placenta was expressed after an interval of half an hour, and its delivery was followed by severe shock and hæmorrhage. The hæmorrhage gradually ceased after the administration of pituitrin; the shock persisted for some considerable time, but its significance was missed by the medical attendant, who attributed the whole of the symptoms to *post partum* hæmorrhage. The inverted uterus was not prolapsed and the absence of the fundus from its usual position had evidently escaped observation. On the third day of the puerperium, as the patient was "running a temperature" and was still very pale, a consulting obstetrician was called in, and he agreed with the medical attendant that the symptoms were due to sepsis following on *post partum* hæmorrhage.

A few days later the patient was sent into hospital, where an examination revealed the fact that the completely inverted and almost completely involuted uterus was lying in the vagina. It would be easy to mistake such a uterus for a prolapsed submucous fibroid, and indeed such mistakes have been reported, where the uterus has been cut away on account of this error in diagnosis.

In this patient it was quite impossible to replace the uterus and after several attempts under anæsthesia had failed, she was given a blood transfusion, but it was at least two months before her health was sufficiently restored to enable her to stand a major operation. Eventually operation by the Spinelli method restored her to perfect health, and since this was done she has had another child, which was delivered by Cæsarean section, as it was considered likely that the rather extensive scar in the uterus which necessarily follows the Spinelli operation would give way after an ordinary labour.

This case demonstrates the necessity of making a thorough examination after every abnormal confinement. It is advisable not to jump to conclusions, even in the seemingly obvious. A diagnosis should be made only after carefully weighing all the evidence gathered after a careful and detailed examination of the patient.

Chorion Epithelioma.

Chorion epithelioma is another cause of late *post partum* hæmorrhage. In this condition the growth begins at the placental site and protrudes into the uterus as a very vascular soft purplish mass. It may extend through the wall of the uterus into the peritoneal cavity. It also invades the veins, and metastases may occur in the lungs, liver, spleen and brain. Vaginal metastases, probably from local implantation, also occur; and it is these which often first call attention to the trouble. Chorion epithelioma occurs both after abortion, especially of a vesicular mole, and after a normal full time pregnancy. Irregular uterine hæmorrhage is generally the first complaint made by the patient. This may occur within a few weeks of the abortion or confinement, or the symptoms may not occur for months and have been reported as occurring as long as four years after the confinement.

SOME OPERATIONS ON THE FRONTAL SINUS.[1]

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IN placing this paper before you tonight I ask for considerable indulgence, since my observations are based on some reading and an experience necessarily shorter and less varied than that of many members of my audience. I hope, however, to stimulate discussion which must be profitable to all of us.

[1] Read at a meeting of the Section of Laryngology and Otology of the New South Wales Branch of the British Medical Association on July 20, 1931.

Disease of the frontal sinus treated by operation presents special problems. It is very accessible from outside, and yet attack from this direction may be a very serious matter. The shape, situation, and nature of the sinus provide it with a high degree of inclination to spontaneous cure of its ills; and so, frequently the simplest measures within the nose suffice to produce the happiest results. It is not expedient to pass directly to the consideration of operations on the frontal sinus without a brief survey of the conditions which call for such treatment. Some attention must be given also to the principles involved and the special qualities and dangers of the part.

Anatomy.

On the subject of anatomy it must be recalled that wide variations exist in every respect. First, the sinus is not developed as a rule before the age of nine years. The size, shape and configuration vary between wide limits, and lack of symmetry is almost constant. This last may be extreme, so that one sinus may overlap or overhang the other to a considerable extent. It is important to recall here that the interfrontal septum lies more constantly in the midline in its lower part. Such variations do not trouble the operator in these times to a great extent, since the use of radiography will have prepared him to meet them.

For anatomical reasons the frontal bone is one that sustains injury badly. It appears to have poor blood supply, and this may be because its arteries of supply are all terminal branches. The nerve supply is a wide one, coming from the first and second branches of the fifth cranial nerve, and includes the supraorbital and frontal nerves, also branches from the naso-ciliary and ethmoidal nerves. The reason for mentioning these is to recall that operation externally by local anæsthesia calls for considerable infiltration along the medial orbital wall, and has met with some serious objection, although it is recommended by many authorities and is the usual method employed by Continental surgeons.

There is an intimate relationship between the frontal sinus and the ethmoidal labyrinth. The floor of the sinus and its duct are frequently invaded by cells of the ethmoid, which are distributed in an unusual manner; and such obviously has an important bearing on the origin and spread of infection as well as on the necessities and requirements of operative treatment. Thus the duct may be invaded from behind by an ingrowth of cells from the *bulla* or may be displaced upwards and backwards by cellular extension of the *agger* group.

Frontal Sinusitis.

Disease of the frontal sinus may be acute or chronic. If acute, it may be simple, that is, catarrhal, or suppurative. Any of these conditions may be complicated by involvement of secondary parts, producing such conditions as ethmoiditis and extradural abscess, or by serious changes within the sinus or its walls, such as polyposis or necrosis. Another condition which may call for operation is mucocele. Naturally, frontal sinusitis in very many cases will subside with the simplest treatment, such as cocainization of the middle meatus, or with no treatment at all. In many other instances there is additional involvement of the maxillary sinus of the same side. Treatment of this by lavage or intranasal operation may be all that is required to induce subsidence of the frontal sinusitis.

The Rationale of Various Operations.

Before passing to detailed consideration of the varied and various classical operations, it will be worth while, I think, to consider briefly the principles underlying them.

The objects to be achieved by different methods of frontal sinus operation are quite diverse. In the main the intranasal procedures are aimed at promoting drainage, while in most of them an attempt is made to enlarge and maintain the original duct or to form an almost entirely new duct, as in Halle's operation. The objective of the external group of operations varies from simple inspection, through the range of wide exploration with or without removal of the lining mucosa, and the establishment of full drainage into the nose, to complete obliteration and elimination of the sinus cavity. Mention must be made here of another principle, namely, the temporary use of a small external opening as an aid to producing improved intranasal drainage by intubation. More will be said of this when the time comes to discuss the operation described by Douglas Harmer. I call this a combined intranasal and extranasal method. Having brought these broad principles to mind, I propose to pass to a brief description of the operations and return to consideration of the principles later.

Intranasal Operations.

The simplest intranasal operation is, of course, resection of the anterior end of the middle turbinal. A great number of patients require nothing more. Should the drainage not suffice, however, there is an abundant choice of methods to hand. Hajek proposed what he named "high resection" of the insertion of the middle turbinal. He took care to remove well the anterior insertion of the *concha*. This certainly gives better access and drainage, but is not without danger of injury to the cribriform plate in its execution. Of the set operations, Halle's is a typical one, involving the preservation of a mucous flap and the enlargement of the duct by chiselling away the frontal process of the maxilla; Halle now removes the bone by means of burrs. The flap is then turned into place to line the new passage. It can hardly be said that Halle's is an easy operation to perform, nor from reports does the passage appear to remain open much better than when simpler procedures are employed.

The middle turbinal is a most important structure, and in operations in the region of the anterior ethmoid and frontal sinus, is a most helpful land-

mark and guard against disaster. It seems to me therefore, that if the ordinary resection of its anterior extremity be regarded as the best preliminary in ordinary cases, it is wiser, should further steps be necessary, to preserve the remaining portion as far as possible. For this reason I have been inclined to the view that the next step may be well taken by the method advocated by Patrick Watson Williams and by Mosher, namely, *viâ* the cells of the *agger nasi* and by reduction of the uncinate process. This gives good access to the infundibulum, and the course from the frontal sinus is at once rendered shorter and straighter. Encroaching ethmoidal cells are readily dealt with, and it is usually easy to obtain good drainage from the frontal sinus without particular difficulty. A matter of importance is the ease with which the dangerous area is avoided, and I have found little difficulty in performing such operation under local anæsthesia by packing only, with an almost total absence of pain.

The great drawback to intranasal operating is the tendency for the infundibulum to contract and become involved in scar. Watson Williams claims that, by using his forward cutting rasps, little mucous lining is destroyed in the duct and its patency is preserved. But he admits to the use of dilators for its maintenance, and that speaks for itself. I have several times carried out this technique and found considerable contraction followed.

Harmer's Operation.

In the production of intranasal drainage in suitable cases I wish to recommend Harmer's operation. It is not suggested for a moment that all cases are suitable. But in selected cases the results are good, as the details which follow will show. Harmer's description is published by him in Carson's "Operative Surgery", 1924, Volume II, page 265. I quote the text in full.

Intubation of Frontal Sinus.—This is preferable to the radical operation and can be safely employed for most of the conditions specified. The intranasal tissues are thoroughly shrunk by plugging the nose on the affected side with gauze moistened with cocaine-adrenalin solution. The eyebrow and forehead are treated with iodine, but not shaved, as the hair grows very slowly in this region. An incision three-quarters of an inch long is made along the inner end of the eyebrow, dividing the tissues right down to the bone. The periosteum is retracted upwards, and the whole wound thoroughly treated with bismuth-iodoform paste. With a chisel and mallet an opening of half an inch is made into the frontal sinus above the supraorbital margin. The centre of the opening should lie three-eighths of an inch from the middle line, as this point is usually above the upper opening of the infundibulum. The mucosa is then divided and the secretion then removed from the sinus. A fine malleable probe is then passed through the infundibulum into the nose and its end seized and brought outside the anterior nares. A stout linen thread having been tied to its lower end, the probe is withdrawn and the upper part of the linen thread drawn through the nose out of the wound on the forehead.

At this stage, or earlier, it is advisable to remove the anterior part of the middle turbinate bone and open up the anterior ethmoidal cells. A soft rubber tube is then attached to the lower end of the thread, by means of which it is drawn through the infundibulum into the frontal sinus. It is essential that the tube should be small enough to pass through the duct without damage to its lining, and when the canal is very contracted there may be difficulty both in passing the probe and in introducing more than a very small tube. The thread is anchored to the skin of the forehead by means of strapping, and the external wound plugged lightly by bismuth-iodoform paste gauze. The operation can usually be done in ten minutes, and causes so little shock that the patient can leave his bed in a day or two.

After-Treatment.—In acute cases a cannula should be passed into the tube and the wound gently irrigated with warm saline solution or peroxide of hydrogen for ten to fourteen days. About this period the tube can sometimes be removed, but only when the external wound has healed and the discharge has completely ceased.

With chronic sinusitis it is necessary to intubate for long periods, generally two or three months. After the first ten days a rather larger tube can usually be inserted and the external wound be healed except at the point where the thread passes out on to the forehead. In many cases irrigation through the tube is only required for a week or two, but this should be continued as long as the discharge is copious. If the tube is not too large, it causes no discomfort, and the patient can return to his work after a few days.

By this simple operation it is possible to dilate permanently the infundibulum. Bone absorption takes place around the tube; a straight canal is produced lined with unscarred epithelium which does not contract later after the removal of the tube. Given careful after-treatment, the majority of cases of acute and chronic sinusitis can be cured without disfigurement.

I have performed Harmer's operation on nine patients. Brief notes of their histories are set out hereunder.

CASE I.—H.S. had for fifteen years suffered from more or less constant pain with chronic frontal sinusitis. This patient is now in the country, but wrote on November 14, 1930, three years after operation: "Not once have I ever had even a touch of headache since—not even an ache."

CASE II.—P.B. suffered from enduring subacute sinusitis with great pain, and was almost suicidal. She now reports that she has had very occasional slight aches, which are easily relieved by small doses of aspirin, but do not trouble her. Operation was performed over two and a half years ago.

CASE III.—M.A. suffered from very troublesome pain and subacute sinusitis with discharge of long standing. The condition did not yield to other intranasal measures. At present there is no discharge and no pain, and the duct is patent. The patient gets occasional slight headaches.

CASE IV.—Mrs. K., a young woman, suffered from chronic sinusitis and a daily fever of 37·2° to 37·8° C. (99° to 100° F.). At first she was considered to be tuberculous. Her condition failed to improve after resection of the septum and the middle turbinal. After Harmer's operation there was a splendid improvement. The temperature ceased to rise above normal, and headaches, which had been unbearable all her life, stopped. She declares she is in very much better health than she has enjoyed since her youth. There is still some discharge from the frontal sinus; it is very slight, but occasonally becomes purulent and forms crusts. The duct is quite patent and easily permits lavage. It has only once been necessary to give a short course of lavage. Operation was performed nearly three years ago.

CASE V.—E.R. was a nursing trainee and suffered a great deal of pain during her final year's work. I was reluctant to operate on her, but she did not improve after septum resection and insisted on undergoing Harmer's operation, as she had nursed other patients. Her wound discharged very profusely throughout the after-treatment, which was prolonged somewhat because of my absence from duty through illness. That is to say, had I been present, the dilating tube would have been removed a week or ten days earlier than was the case. The wound healed immediately the tube had been left out, and the patient

recovered in a remarkable way, gaining 12·6 kilograms (two stone) weight in a few months. She has had no sign of further trouble, and the scar is quite invisible.

CASE VI.—A.R. was under observation for a long time before operation and suffered from recurrent frontal sinusitis. He was subjected to a bilateral operation over two years ago. He has reported several times since with recurrences and says there is considerable discharge at those times. I have only once seen any discharge at examination; the ducts are freely open, and lavage is very easy to perform. Notwithstanding his recurrences, his condition is much better than before, both locally and generally. The cause of complaint quickly clears up and occurs only about once a year.

CASE VII.—T.A., a man with chronic sinusitis and a very large sinus, was operated on over two years ago. The scar is invisible. He has had no pain and no discharge since the operation.

CASE VIII.—Mrs. P. had a generalized sinusitis and a great deal of neuralgic pain, not confined to the head. She first underwent antrum operation and resection of the middle turbinal. About a year later Harmer's operation was performed at her own request. There is still some pain in the head and elsewhere, but the sinus is now mostly dry and freely open. Some months ago, before dryness had developed, the sinus was treated by the introduction of an appropriate antivirus. This was easily done through a cannula.

CASE IX.—Miss H. was operated on last year for frontal pain. The patient is extremely neurotic and not a good patient for any operation. She had remained unrelieved by other intranasal procedures. By reason of her nervousness dilatation was not carried out to a satisfactory degree, but her pain is much less and her sinus is now dry.

I attempted the operation on one more patient, a girl aged nineteen years, with a very small sinus. The fronto-nasal duct permitted the downward passage of the probe, but it proved quite impossible to pull it up again with the silk attached. Accordingly, I had to abandon the project, and treated the sinus by obliteration, with good result both clinically and cosmetically.

I do not think it is an over-statement to say that these cases show Harmer's operation to be worth a good trial. On account of the rather unsightly condition during the after-treatment, it has been received without favour by some who have not tried it; but it is simple in execution, causes no deformity, and seems to me to produce a better result in respect of patency and absence of nasal scarring than interior operations I have seen.

External Operations.

The purely external operations are many and varied. The indications for their use are briefly: (i) Continuance of pain and symptoms after endonasal treatment; (ii) the presence of complications, for example, periostitis or fistula following extradural abscess *et cetera*; (iii) fulminating infections.

The methods of operation include: (i) Several osteoplastic flap methods of resecting the anterior wall, with drainage into the nose and reposition of the flap; (ii) the provision of small temporary openings in the anterior wall for treatment purposes, as recommended by Hajek; (iii) resection of the whole of the anterior wall (Kuhnt's method), allowing the wound to granulate; (iv) removal of the lower (orbital) wall only, and exploration of the ethmoid through the wound (this is included in the methods aiming at production of wide drainage into the nose, and is spoken of frequently as Howarth's operation); Killian's method of leaving a bridge standing in the region of the superciliary ridge, with removal of a window in the anterior wall, the ethmoidal cells, and the inferior wall, and making wide drainage into the nose (it aims at a good cosmetic result); (vi) total ablation of the walls of the sinus (Riedel's method). In Riedel's method as much as possible of the diseased mucosa is removed.

A great deal of time, patience and ingenuity in these operations has been devoted to the cosmetic results. A study of the histories reveals that very often the lack of deformity has been bought at the price of failure. Not only do recurrences take place, but danger to life itself occurs, and we find the authority of Logan Turner's text book for the statement: "The most radical procedures are more likely to avoid complications." In the fulminating cases there can be no doubt that the most radical treatment is called for without delay. When less is done, danger ensues; and the following brief history will point the moral.

T.U.G., aged twenty-eight years, was admitted to hospital suffering from frontal pain of one week's duration. He had had a cold for two weks and had noticed a swelling of the forehead and the left orbit on the previous evening. He had vomited on the two previous evenings. He was in pain and was mentally confused. Pus could be seen in the left middle meatus. Transillumination of the left frontal and maxillary sinuses was dull. The middle meatus was cocainized, and the antrum was washed out, but the condition had advanced by the next day. An external frontal operation was done; the inferior wall of the sinus was removed, and the ethmoidal cells were explored and exenterated; a drainage tube was put into the nose and the wound was allowed to close. Two days later a Caldwell Luc operation was done on the antrum, and progress was continuous, except for the peristence of a small fistula at the inner angle of the orbit.

Nearly two months later a fistula was still present, and the wound was reopened because it had been decided that the operation had not been sufficiently radical. The whole posterior wall of the left frontal sinus was found sequestrated, and necrosis of the interfrontal septum was well advanced. The right frontal sinus was also suppurating. The incision was then carried across to the limit of the right frontal sinus and the anterior and inferior walls were removed. The sequestrum was carefully extracted, and the whole wound packed and treated by the open method. This aimed at and obtained complete obliteration of the whole frontal sinus. The cavity healed well in a remarkably short time (about six weeks). The patient has remained quite well for two years. It is probable that radical treatment would be better in less acute cases requiring operation.

To revert to what was said earlier, two different targets are aimed at by different methods of exterior operating. One class of operation aims at providing wide drainage into the nose; the other aims at total obliteration of the cavity of the sinus and shutting it off from the nose entirely. This is attained by keeping the wound open by packing it until it gradually granulates up. This process takes much less time than one might think; further, the cosmetic results of such a procedure are surprisingly good. About this plan little more need be said. The resulting sound healing, the easy control of the wound through all stages, and its freedom from hidden dangers, recommend it highly as a surgically sound course.

The drainage methods require further comment because most of them lead to formation of dead spaces in the sinus. This is particularly true of Killian's operation. The sinus is no longer lined by its mucosa, which is removed at operation. The drainage opening into the nose also, though made of liberal size at the operation, soon shrinks, and is maintained with difficulty. Altogether there is little doubt that the results are inferior to the open packing method.

Summary.

Operations on the frontal sinus fall into three classes.

1. *Wholly Intranasal.*—Intranasal operations are suitable for acute cases of less severity; they are also justified in more severe cases as a preliminary step. Preference has been indicated for the method of P. Watson Williams, traversing the *agger nasi.*

2. *Wholly Extranasal.*—Extranasal operations are required in fulminating and in complicated cases. In this group of operations there are two classes of procedure: (*a*) with wide drainage into the nose, (*b*) with obliteration of the sinus by granulation. The obliteration method is the approved one and the only safe one in fulminating cases.

3. *Combined Intranasal and Extranasal.*—The combined intranasal and extranasal operation is typified by Harmer's intubation method. This is suitable in acute or subacute cases, also in the "vacuum headache" group. Its use gives excellent results without deformity.

Conclusion.

Through the inclement weather we recently suffered, the reading of this paper has been postponed for about two weeks, and in the interim *The Journal of Laryngology* for June, 1931, has come into my hands. This is filled with information about operating on the frontal sinus, and is especially interesting because of an article on the intubation of the sinus, by Douglas Harmer and Bedford Russell. They indicate certain minor refinements and changes in the method. In the main these consist in a warning to avoid the supraorbital nerve in the incision and to avoid suturing the forehead wound when there is suppuration; the amount of syringing recommended is much reduced. I may say that my own experience of the operation is based on personal contact with Mr. Harmer and not on reading the article I quoted to you earlier; so that the method I employed in the treatment of the patients whose histories are given, was more on the lines indicated in this later writing.

There is one other point worth noting in this new communication. It is now recommended, when there is much suppuration, to pull the end of the tube through the forehead wound for a time. I have never found it necessary. Any inflammation or suppuration of the forehead wound has been easily controlled by ordinary means.

PALLIATION AND X RADIATION.

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> I will follow that system of regimen which, according to my ability and judgement, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous. I will give no deadly medicine to anyone if asked, nor suggest any such counsel . . . .
>
> (From the Hippocratic oath.)

As the human body grows older, so does the phrase "permanent cure" gradually fade from the medical dictionary. Death is the most terrible of all things because it is a limit, so it is the unwritten law of medical science that no patient must be allowed to die if life can be preserved. It then follows that the art of medicine, to a great extent, consists merely in the preservation of life without any prospect of ultimate cure.

To mitigate physical suffering, and so to banish to a small degree the resultant mental cares and worries of the pronounced invalid, is something to be achieved. The dread of "growing old", so often expressed by brilliant men—and it has been heard more than once from those of our own profession—does not necessarily mean the fear of death. The brave man is fearless at sea, but not from the same cause as seamen; for the brave give up all hope of safety, but the seamen are sanguine because of their experience.

Not only does a patient fear disease, but he fears those things that are the friends of disease—poverty, humiliation, death and (purposely it is placed last) friendlessness. The person in continued sickness or pain is undoubtedly a nuisance, not only to himself, but to his household, and as time goes on, so does he have fewer and fewer visitors to his bedside. Distress of body or mind must, therefore, be alleviated if possible.

The palliation of disease, the ability to prolong life, especially when that life can be made once again economically useful, bring a sense of exultation to the medical practitioner and untold joy to the patient. Cardiac disorders, which head the mortality rate, are naturally the main cause of physical discomfort in old age, but little comment is passed on our usual inability to restore the failing heart to robust health, even after weeks of treatment by useless and inefficient drugs. The wheezing chronic asthmatic, the neurotic visceroptotic, the pale nephritic and ponderous arteriosclerotic these days appear to obtain less immediate benefit from the attention of the medical profession than do their carcinomatous sisters, brothers and aunts.

Let us consider cancer in particular, the disease that is on every tongue (not literally as yet). Cancer is the most dreaded curse of our generation, increasing year by year, and the medical world undoubtedly is wide awake to the fact. When Germany, after the war, released from Erlangen

the modern high voltage X ray technique, now known as deep X ray therapy, it was hailed as a cure for all types of growths. Like most other discoveries in the medical world, it took time for this new form of treatment to find its proper niche. Now, ten years after, experience and research have shown the type of patient who reacts well, and the best type of dose to cause that reaction. Workers have admitted their failures and claimed their successes.

Radium at the present moment is having its day, and for surface lesions of the tongue, mouth, lip and other approachable affections of the mucous membrane and skin, still holds sway. High voltage X ray therapy is rapidly growing to man's estate. Already there are being manufactured X ray apparatus and tubes capable of giving off rays equal to three grammes of radium. Not only medical practitioners, but patients themselves, are learning that incisions of the skin, anæsthetics, pain and hospitalization are not necessary adjuvants to the relief of symptoms.

The abnormal overgrowth of the normal cell unfortunately does not often remain in one specific region of the body; hence the greater the area irradiated, the greater the chance of catching that wandering, irresponsible, but at the same time very virile, exasperating, and none the less dangerous, unit that has run away from home. Cold baths have been an aid in enteric fever, and one day it may be possible to prevent metastatic growths by bathing the body with properly filtered X radiation of voltages at present undreamt of.

Palliation and X radiation go hand in hand in various ways. Even in those patients with gross bone metastases, and with large, inoperable, local lesions, pain is relieved in at least 90% of cases. Still more, secondary involvement of bone and metastatic deposits in other organs can often be treated to such an extent that, for a comparatively long period, complete relief is obtained, and the patient returns to work and remains of economic value to the community for some years. Again, there is no necessity for any surgical operation, no matter how slight, and the question of becoming a hospital inmate is not considered. Numerous patients at present admitted into hospital for treatment by radium could just as efficiently be taken care of by deep X ray therapy. For instance, at the Royal Prince Alfred Hospital, on account of overcrowding in the deep X ray department, these patients are costing the hospital at the rate of £3 10s. per week each; so that, taken over a period of one year, if six patients per week only were admitted for treatment by radium, "needling", "distance" *et cetera*, the cost would be £1,092 *per annum*. If these patients could all be treated by deep X radiation, in two years' time the saving effected would cover the cost of installing an additional very badly needed deep X ray therapy machine.

In the very advanced cases in which deep X radiation is employed, a marked, but temporary, improvement, with loss of discomfort, results. Then, when the ultimate crash does come, there are usually no long months of helpless inactivity; but the growth appears to have suddenly overcome the normal resistance of the body tissues, and death results in a comparatively short period.

X ray therapy may now be regarded as in the third stage of its career. The first stage was that of the new discovery, with all the attendant enthusiasm and jubilation. The second occurred when it, to a great extent, fell into disfavour, partly on account of a natural reaction in medical opinion, and partly on account of bad technique, faulty apparatus and little knowledge on the part of the operator. With better machines, better tubes, permitting higher voltages and greater filtration of the rays, we may consider that the future radiologist will look on our present apparatus as we do now on the inefficient single-cylinder motor car of only twenty years ago. It is only within the last few months that there has been given to structures such as malignant cervical glands, malignant prostate and malignant rectum, an X ray dose that will in any way cause marked retrogression. This is all due to higher voltages and filtration through greater thicknesses of copper.

As examples of what relief can be obtained, even in extreme cases, I take the following cases, which have all occurred during the past twelve months in hospital or private practice. No claims for ultimate cures are put forward, although cure is not an impossible or even improbable result.

Two patients who were totally blind at the commencement of treatment, have regained their sight; one suffered from a pituitary tumour, the other a growth near the optic chiasma. Two patients suffering from advanced inoperable cancer of the rectum, after nine months, are heavier in weight, and the growth itself is definitely smaller. These are the only two cases of rectal carcinoma in which treatment has been administered through a thickness of two millimetres of copper and with a higher voltage than previously used through the tube. Carcinoma of the prostate is showing definite retrogression in some cases. This type of new growth was one of the hardest to attack. An advanced abdominal lymphosarcoma has decreased so markedly in one instance that a boilermaker has been back at work for six months. The treatment of mammary carcinoma has been somewhat disappointing; but from now on results should be better. For all that, in one afternoon, three patients who had had enlarged supraclavicular and axillary glands, were told that they need not report for six months, as they were apparently free.

Uterine carcinoma is still one of the most difficult types to treat. However, in almost all cases some immediate relief is obtained, often so much that the patient looks forward to complete cure. The patients put on weight, the bleeding ceases, and the improvement in the mental outlook is most pronounced. For months these people look and feel well, but then usually the sudden relapse occurs.

A patient suffering from a tremendously enlarged, hard, carcinomatous thyreoid, after being rejected as hopeless by one committee, was ultimately treated by means of this extra copper filtration, and now, four months later, the only sign of growth is some thickening along the left sterno-mastoid muscle.

Similar results of the treatment of numerous different types of new growth, situated in various parts of the body, could be quoted.

An extraordinary feature of this class of patient is the extreme desire, "a hunger", for treatment. Old and feeble as some may be, not only do they not miss appointments, however inclement the weather, but they arrive long before the appointed hour. If by chance a treatment be not given, the disappointment, almost grief, is sad to see and difficult to allay.

Reports of Cases.

SUBACUTE BACTERIAL ENDOCARDITIS.

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THE following case illustrates many of the characteristic features of subacute bacterial endocarditis, and is of particular interest in that recovery occurred.

Mrs. M.E., a widow, aged twenty-nine years, by occupation a post-mistress, was first seen on March 4, 1925. She complained that nine weeks previously she had had an attack of influenza—headache, generalized pains and fever. Two weeks later she had improved sufficiently to enable her to leave her bed, but after a few days she had a severe rigor and returned to bed. Rigors occurred daily, but there was no sweating unless antipyretics were used. The appetite became capricious, and weight and strength steadily declined. At this time, although no symptoms referable to the urinary tract were present, there were apparently some abnormal constituents in the urine, and the provisional diagnosis of pyelitis was made by her medical attendant. Treatment was adopted in accordance with this diagnosis, but no response occurred, and the patient was sent to the Alfred Hospital on February 20. She stated that while she was in hospital the rigors continued. The attacks commenced with sudden dyspnœa and slight blueness, palpitation and tachycardia. These symptoms gradually decreased, to be followed in about fifteen minutes by a rigor, which resulted in headache and general pains, but was not succeeded by sweating. On February 28 a long chained streptococcus was isolated from the blood, and the patient left the hospital on March 4.

When examined on that day she was obviously a very sick woman, very thin, with flushed face, tachycardia and a temperature of 39·4° C. (103° F.). There was no suggestion of cyanosis. The apex beat of the heart was in the fifth left intercostal space, 8·75 centimetres (three and a half inches) from the mid-line. There was no increase in right cardiac dulness, but dulness extended one finger's breadth to the left in the second left intercostal space. A systolic pulsation was visible over this area. A soft systolic bruit was audible at the apex beat and over the adjacent precordium, while at the base of the heart a continuous, loud, blowing murmur, maximum in intensity during systole and best heard in the second left interspace, was present. This bruit was also audible at the aortic region and at the left interscapular region. A systolic thrill was palpable at the base. The pulmonary second sound was not accentuated.

Persistent crepitations were audible in the lower part of the right axilla, but there was no evidence of consolidation of the lung. The lower pole of the right kidney was palpable and tender; the spleen was easily felt on inspiration.

No albumin or sugar was detected in the urine, but a few pus cells, red blood corpuscles and bacilli were present in a non-catheter specimen.

There was a mild degree of secondary anæmia, with 10,000 leucocytes per cubic millimetre. The differential leucocyte count was within normal limits and no malarial parasites were seen in the blood films.

There appeared to be no doubt that the diagnosis of infective endocarditis was correct, and symptomatic treatment was instituted, the object being to make the patient as comfortable as possible and to maintain general nutrition while enforcing complete surgical rest. No active movements were permitted and the patient was not allowed to feed herself.

Daily intermissions of temperature continued, rigors being followed by a rise to 38·9° to 40° C. (102° to 104° F.). Petechiæ appeared irregularly, but especially in the lower cervical region. Red blood cells were persistently present in the urine.

On March 19 Sir Richard Stawell attended in consultation. He had seen the patient thirteen and a half years previously and found most gross murmurs in the aortic and pulmonary regions. The murmurs were much more intense then than they were on March 19, but he felt no doubt that an infective lesion had been superimposed upon a congenital abnormality.

On March 30 she had a sudden attack of pleuritic pain in the right side of the chest, associated with distressing cough and a rigor, the temperature rising to 40·9° C. (105·8° F.). Dulness, diminished breath sounds, diminished vocal resonance and fremitus were present at the right base, and on the following day a friction rub and moist sounds appeared. Subsequently there were repeated attacks of a similar nature, followed by evidence of consolidation and pneumonitis at both bases; each attack was associated with increased fever.

In April unconcentrated diphtheria antitoxic serum was given by mouth, but it appeared to have no effect other than the production of nausea. On May 19, 150 milligrammes of mercurochrome were given intravenously at 3.30 p.m. There was some colicky abdominal pain during the afternoon, but at 9 p.m. she had a sudden attack of very severe colicky abdominal pain with vomiting, and within a few minutes blood-stained mucus was passed *per rectum*. The abdomen was rigid, with diffuse tenderness. Morphine was given, with some relief, and the pain gradually eased. During the next day there was slight pain and small quantities of blood-stained mucus were passed at frequent intervals. By the following day pain had ceased. This attack was considered to be due to mesenteric embolism, but, as it did not appear that the mercurochrome was in any way responsible for the attack, 100 milligrammes were given on May 22. No ill effect was noticed, but similar doses on May 25 and 30 made her feel ill and resulted in definite coloration of the urine; and as no beneficial effect was demonstrable, no further injections were given.

On June 17 there was evident increased extent of the pulsation in the second left interspace, and two fingers' breadth of dulness. From time to time tiny painful areas were noticeable on the fingers, especially at the tips.

During July there was another severe attack of pain in the chest, with evidence of infarction. Infarction of the spleen occurred—pain, enlargement of the spleen and audible friction over that organ. Microscopical hæmaturia persisted. Towards the end of the month, however, the temperature was distinctly lower, and she returned by ambulance to her home in the country.

During August the temperature chart showed irregular elevations to 37·8° to 38·9° C. (100° to 102° F.), with morning remissions, but her general condition had improved considerably, although she was still very emaciated. The pulsation was visible and palpable, to three and a half fingers' breadth to the left of the sternum; patchy consolidation still existed at the bases, and the spleen was still definitely enlarged.

Thereafter the fever gradually subsided, and by the end of October, 1925, the patient was able to be lifted out of bed into a chair without effect on the temperature or pulse rate. No pain had been experienced for four weeks.

In November a few slight rigors occurred, but when examined on the fifteenth of that month, the bases of the lungs were clear, a few crepitations in the left axilla being the only evidence of a parenchymatous change. The cardiac signs were unaltered, and the spleen had not decreased in size.

Throughout the next few months steady improvement continued, despite occasional slight shivers and mild attacks of pain in the chest. No attacks occurred after February, 1926, and on April 5 of that year she reported

that she was able to walk, if assisted, that the temperature had been normal for six weeks, and that menstruation, which had been in abeyance since February, 1925, had recommenced. Steady progress was made, carefully graduated exercise being permitted, and on February 18, 1927, it was found that the bruit had greatly decreased in intensity. There was only one finger's breadth of dulness in the second left interspace, and the patient was well, although she still experienced slight dyspnœa on exertion.

On May 22, 1928, a double bruit was audible at the base, but when last seen, on August 7, 1931, the signs had altered considerably. Dulness was present as on the preceding occasion, and no general cardiac enlargement was demonstrable. A rough systolic bruit was audible, being maximum in the third left interspace. It was especially noticeable during full expiration, and almost disappeared with full inspiration. It was not conducted into the great vessels or axilla, did not vary with posture, and was faintly heard in the left interscapular region. She appeared to be in excellent health, and said that, excepting occasional attacks of "fluttering" of the heart (apparently runs of extrasystoles) and slight dyspnœa when walking up hills or ramps, she felt very well.

Discussion.

There appears to be little doubt that the patient was suffering from subacute bacterial endocarditis. The history of an old cardiac lesion, alteration of the cardiac signs with the progress of the clinical condition, long continued intermittent pyrexia, multiple embolic phenomena, with petechiæ and microscopical hæmaturia, splenic enlargement and infarction, and a positive blood culture, all tended to confirm the diagnosis. Certainly the objection could be raised that the presence of only one positive blood culture was not sufficient definitely to establish the diagnosis; but the presence of all the other characteristic signs and symptoms made repetition of this test less necessary. It is also unfortunate that the streptococcus which was isolated, was not definitely classified according to type; but as 95% of these cases are due to *Streptococcus viridans* (Libman), the organism presumably belonged to that type.

Whether the illness in the first week in January, 1925, was actually influenza or not is not of very great importance. It is well known how insidious the onset of subacute bacterial endocarditis may be, and it is highly probable that the endocarditis had commenced prior to the onset of this febrile attack. Lewis and Grant[3] maintain that in a very appreciable number of cases of this disease neither the strength nor the quantity of the poison introduced, nor the presence of local foci of infection, nor the weakness in the general defences of the body, determines the disease. In the present instance it is difficult to conceive how such gross cardiac manifestations could have developed in such a short period, unless gross ulceration or very profuse growth of vegetations had occurred. This latter supposition would necessitate the diagnosis of acute or malignant endocarditis, from which it is inconceivable that recovery could occur.

It has been repeatedly stressed that infective endocarditis, in the large majority of cases, occurs in patients who have previously sustained some valvular lesion as a result of infections such as rheumatic fever or chorea. Abbott[1] has pointed out that congenital anomalies of the non-cyanotic type, especially bicuspid semilunar valves, defects of the upper portion of the interventricular septum, and patent *ductus arteriosus*, are very frequently the site of infective processes. The patients with milder congenital cyanosis due to pulmonary stenosis, who reach adult years, are also prone to suffer from this affection. The explanation of this appears to lie in the formation of a *locus minoris resistentiæ* at the site of the lesion. The absence of a previous history of rheumatic fever or chorea, and the type of lesion present when she was seen at the age of sixteen years by Sir Richard Stawell, pointed to the presence of a congenital lesion in the case recorded; and the absence of cyanosis or "blueness" at any time other than the cold stage of the rigors, placed the patient's predisposing affection amongst the non-cyanotic group of cardiac abnormalities.

Abbott[1] divides cases of congenital cardiac disease which are of clinical significance, into two groups, according to whether cyanosis is present or not.

The cyanotic group comprises those cases with venous-arterial shunt, and the right-sided valvular lesions with closed septa; and this group does not enter into the discussion in the present instance.

The non-cyanotic group is subdivided into:

1. Cases in which no abnormal communication exists between the two sides of the heart, but in which the defect may produce mechanical interference with the circulation. The commonest of these are: coarctation and hypoplasia of the aorta, anomalies of the semilunar and auriculo-ventricular valves, anomalous septa, anomalies of the aortic arch, aortic stenosis and atresia, and pericardial defects.

2. (*a*) Cases of arteriovenous shunt, with possible terminal reversal of blood flow, defects of the inter-auricular septum, such as persistent *ostium primum*, persistent *ostium secundum*, patent *foramen ovale*, complete absence of the septum. (*b*) Localized defects of the interventricular septum. (*c*) Patent *ductus arteriosus* and localized defects of the aortic septum.

In the above case it is evident from the embolic phenomena that there must have been some communication between the pulmonary and systemic circulations, unless we assume that there was a bilateral infection of the heart. It is far more probable that the lesion was situated at the site of some abnormal communication between the circulations or proximal to such a defect. If present, any of the lesions of Group 1 must have been associated with a lesion belonging to Group 2.

In the absence of electrocardiographic and X ray examination it is more difficult to make a definite diagnosis of the actual congenital lesion present; but from consideration of the physical signs and the symptoms, it is possible to say, with some degree of certainty, that the predominant lesion was patency of the interventricular septum.

Let us consider the possible lesions, as in Group 2. Defects of the interauricular septum may exist without producing any sign or symptom and without interfering with the duration of the life of the individual. Usually there are some characteristic physical signs, hypoplasia of the aorta and an absence of cyanosis, except as a terminal manifestation. Fragility of build, pallor, dyspnœa and a tendency to bronchitis and pulmonary congestion are common accompaniments. The bruit, when present, is usually maximum in the third and fourth left interspaces; it is diastolic, presystolic, systolic, or consists of combinations of these, and is often accompanied by a thrill; and both bruit and thrill may vary in intensity and rhythm with the position of the patient or on different occasions. The lesion may be associated with mitral insufficiency or stenosis, the latter complication being not infrequent. Defects of the lower part of the interauricular septum are usually associated with extensive deformities of the auriculo-ventricular cusps, and the murmur is often best heard at the apex. Inconstancy of the bruit is an important point which was absent in this case. It appears to be improbable that the lesion was patent *foramen ovale* or defect of the interauricular septum.

In patent *ductus arteriosus* the murmur usually begins towards the close of systole, is continuous throughout the whole of the cardiac cycle and is described as a harsh, rumbling, machinery murmur. When it occurs, this bruit is pathognomonic. The bruit may, however, be systolic in time or, rarely, diastolic, is maximum in intensity in the second left interspace, where a thrill is often palpable, and is also heard in the left interscapular region. The pulmonary second sound is usually accentuated. Gerhardt described as characteristic a visible pulsation in the second left interspace, produced by the forcible closure of the pulmonary valves; he also described an increased area of cardiac dulness, especially to the right, and a narrow strip of dulness, three to four centimetres wide, at the base of the heart and along the left sternal border from the third to the second or first rib. This he considered to be due to dilatation of the pulmonary

artery, and this has been confirmed radiologically in some cases. Cardiac hypertrophy is common, especially of the right side of the heart.

In the case under consideration the bruit did at first resemble that of patent *ductus arteriosus*, but there was no increase of the right cardiac dulness at any time, the pulmonary second sound was not accentuated, and after recovery the murmur was purely systolic in time. There was neither accentuation of the bruit with inspiration nor expiratory diminution of the murmur, and *pulsus paradoxus* was not present. Also, if this lesion had been present and the site of inflammation, it is difficult to conceive how the pulmonary artery could have made such a good recovery from so marked dilatation, which would be associated with and largely due to endarteritis. In any case, it is not possible to be sure that the area of dulness and pulsation were due to dilatation of the pulmonary artery.

Localized defect of the aortic septum appears to have been an unlikely cause, for the murmur was not at any time found to be conducted into the great vessels of the neck, and was only faintly heard to the right of the sternum.

In localized defects of the interventricular septum (*maladie de Roger*), there is a constant, harsh, systolic bruit, usually maximum in intensity in the third and fourth left interspaces, but which may be loudest in the second interspace. It does not vary in rhythm or quality or with the position of the patient, is not as a rule conducted into the axilla, and in about one-third of the cases is accompanied by a thrill. There is no evidence of cardiac insufficiency and no cardiac enlargement. In fifteen of Abbott's forty-six cases of defects of the upper part of the interventricular septum, without dextroposition of the aorta, there was also dilatation of the pulmonary artery.

The majority of congenital cardiac defects are, however, complicated, and it is often difficult and sometimes impossible to say what the primary lesion is. While it is possible that there were more than one congenital defect present in the above case, the diagnosis of a localized defect of the interventricular septum would explain the physical signs at the age of sixteen, at the onset of and during the illness and after recovery, the occurrence of embolic phenomena in both the pulmonary and systemic circulations, and the absence of signs or symptoms of cardiac insufficiency prior to the illness.

Libman (quoted by Abbott) pointed out that, when superimposed upon congenital cardiac disease, the infective process is usually of the subacute or chronic type; and this is especially true of the left-sided lesions, particularly bicuspid aortic valves.

Lewis and Grant[6] reviewed 116 cases of bicuspid aortic valves, including eight or possibly nine of their own, and concluded that subacute infective endocarditis (to use their own term) was determined by the antecedent local valvular defect. They also pointed out that this type of endocarditis is distinctive in infective endocarditis, in that the course is very protracted, the organism remains lethargic for long periods, and the systemic reactions of the patient are inconspicuous in all but the terminal stages of the disease. The tissues react locally and manifest abundant signs of partial healing, but healing in the complete sense is scarcely known to occur. The history of the disease, in the individual case, is the history of a long drawn out struggle in which fluctuations in the well-being of the patient occur, the end result being due to the occurrence of some complication.

Acute infective endocarditis, on the other hand, is frequently found to affect the right side, and is usually not determined by the presence of a local valvular defect. The valve lesion is only part of the general systemic disturbance, and the focus of infection is, as a rule, very evident. Abbott[1] states that the greater proportion of cases of endocarditis involving the right side of the heart and pulmonary artery in ventricular septal defect and patent *ductus arteriosus* are of the acute type and due, not to the hæmolytic streptococcus, but to the pneumococcus, gonococcus, staphylococcus or other microorganism of high virulence. The course of this disease is that of a malignant septicæmia; the patient sinks steadily and rapidly, and local evidence of healing is almost absent at autopsy.

It follows that the identity of the infecting organism should in all cases be determined, and that the prognosis in any given case is to some extent to be guided by the nature of the primary lesion present and the type of the organism; but it is ultimately dependent on the resistance of the patient and the absence of serious complications, such as cerebral embolism, intercurrent infections and renal insufficiency. The case recorded illustrates that the severity of the illness in the initial stages cannot be taken as an indication of the probable course of the malady.

In the treatment of the patient the most important single factor was undoubtedly the complete rest which was insisted upon during the acute stage of the illness. It is impossible to speak too highly of the wonderful way in which the patient performed her part in this respect. After the necessity for refraining from effort was explained to her, she was exemplary in her observance of the instructions and in her patience and perseverance, despite the prolonged course of the illness.

Symptomatic treatment was chiefly directed to the relief of the pain and coughing, and for these heroin, given by mouth, was the most useful drug. It required great strength of mind for her to relinquish this drug after taking it almost continually for twelve months, but the value of the measure was undoubted; much suffering was obviated, and the risk of causing a drug habit was obviously justifiable.

Although the use of mercurochrome for intravenous therapy has now rightly fallen into disuse, at that time it was highly praised. It did not appear to do harm in this instance, but the patient complained that she felt very ill after each injection, except the first. Burn, quoted by Sir William Willcox,[8] has shown that samples from different manufacturers vary greatly in their toxicity, and Willcox states that, while acting especially on the kidneys and colon, this drug has some toxic action on the liver and may cause toxic jaundice.

In connexion with the use of the so-called chemotherapeutic agents and in view of the extensive use of acriflavine during recent years, it is of interest to note that Cullinan[3] reports the occurrence of toxic jaundice after the use of acriflavine by mouth. Major D. H. Murray[9] refers to the toxic effects found after the administration of acriflavine. Various "immediate" effects have been described, none of which were serious, for example, slight syncopal attacks, constriction of the throat, bitter taste in the mouth, congestion of the face, transient palpitation and vomiting, local urticaria at the site of injection. There was often slight fever at night, followed on the same or the next day by urticaria. Towards the fifteenth day of treatment a cumulative effect has resulted in "delayed" symptoms. These were slight nausea, cardiac irritability and staining of the skin. In about 11% of cases in which the drug was given by the intravenous route, jaundice occurred eight or more weeks after the last injection. The average delay was 82·3 days. The size of the dose had no bearing on the occurrence of jaundice. One patient died and the diagnosis of acute yellow atrophy was confirmed at autopsy. Birch[2] also reports the occurrence of jaundice after intravenous injection of acriflavine, but in only 3% of cases.

On the other hand, Hanschell[4] and Simpson[7] submit evidence of the extensive use of the drug without ill effects, and it may be that, as with mercurochrome, samples differ in their degree of toxicity. In any case, the indiscriminate use of the drug is to be deprecated.

Sir Almroth Wright[10] discusses the intravenous use of antiseptics and maintains that it is futile to expect a bactericidal and sterilizing effect in the organism from the use of such endohæmic antiseptics as are slow in action and vanish very quickly from the circulation, and that a similar action can be looked for only from those drugs which can be used in concentrations which exert a bactericidal action in the serum and blood *in vitro*. He eliminates the ordinary antiseptics and mercurochrome, as they fail to exert a bactericidal action when added to serum and blood in the highest concentrations which would be permissible in the organism. He excludes gentian

violet and flavine, and presumably acriflavine and euflavine, because they are slow in action and vanish very quickly from the circulation. It appears, therefore, that we have at present no endohæmic antiseptics which are of definite value in septicæmic conditions.

Transfusion of blood from a person immunized to the infecting organism was suggested early in the illness, and was later urged by the relatives of the patient; but at that time it was considered that the strain on the myocardium might be too great, even if the greatest care was exercised. However, at the very time that this measure would have been adopted, if the wishes of the relatives had been granted, the patient definitely commenced to improve, and we were thus prevented, fortunately, from attributing the improvement to this doubtful therapeutic measure.

The continued progress of the patient after subsidence of the acute stage and the fact that she has remained well for more than five and a half years after apparent recovery, must be accepted as evidence that another case of recovery from subacute bacterial endocarditis has been recorded.

Summary.

1. The history of a case of subacute bacterial endocarditis which ended in recovery, is given.

2. The nature of the congenital cardiac defect which was the underlying cause of the disease, is discussed, together with certain facts regarding the occurrence of infective endocarditis in its acute and subacute or chronic forms.

3. Treatment is discussed, with special reference to the use of endohæmic antiseptics.

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(2) C. A. Birch: "Acute Toxic Hepatitis After Acriflavine", *The Lancet*, Volume I, January 31, 1931, page 269.
(3) E. R. Cullinan: "Acute Toxic Hepatitis After Acriflavine", *The Lancet*, Volume I, January 24, 1931, page 218; February 28, 1931, page 498.
(4) H. M. Hanschell: "Acute Toxic Hepatitis After Acriflavine", *The Lancet*, Volume I, January 31, 1931, page 270.
(5) T. Lewis and R. T. Grant: "Observations Relating to Subacute Infective Endocarditis", *Heart*, Volume X, 1923, page 21.
(6) D. H. Murray: "Acriflavine: Its Use, by Intravenous Injection, in the Treatment of Gonorrhœa", *Journal of the Royal Army Medical Corps*, Volume LIV, January, 1930, page 19.
(7) T. Y. Simpson: "Acute Toxic Hepatitis After Acriflavine", *The Lancet*, Volume I, February 7, 1931, page 323.
(8) William Willcox: "Toxic Jaundice", *The Lancet*, Volume II, July 11, 1931, page 63.
(9) Almroth Wright: "On Vaccine Therapy and Immunisation in Vitro", *The Lancet*, Volume II, August 1, 1931, page 228.

THREE CASES OF SUPPOSED EARLY TETANUS.

By MARY C. DE GARIS, M.D., B.S. (Melbourne),
Geelong.

I DO not myself feel any doubt as to the three cases here recorded being instances of incipient tetanus, aborted by small doses of antitetanic serum. In considering the diagnosis, note:

1. In all there was a definite history of a punctured or deep wound which had healed or was healing without local signs of infection and which had been inflicted within a probable incubation period.

2. In all, the symptoms were paroxysmal and severe, out of all proportion to the physical signs, and accompanied by fear on the part of the patient (least noticeable in the third case, but almost amounting to terror in the first).

3. In Case I the paroxysmal symptoms were generalized, while in the others they were limited to the limb in which the infection occurred, though it is possible that the "pullings" complained of by the third patient were an early threat of generalization.

4. In all, speedy relief followed the administration of antitetanic serum, though in the two last cases the dose had to be repeated. If my recollection is correct, the first patient had 3,000 units in one dose. The fact that the other two patients recovered on the same or less (but in divided doses) seems to me to justify the diagnosis in her case also, especially when one notices the complaint of stiffness about the jaws, the presence of a jaw jerk, the family history, and the subsequent nervous state.

5. What alternative diagnosis could be made?

Case I.

Mrs. J., aged twenty-two, with a baby seven weeks old on the breast, sent for me on December 11, 1923. Her illness began at 11 p.m. the previous night with a dumb, dull feeling over her, a chill up the back, shivers and pain across the back and abdomen. The shivers had passed off, but she had nausea that morning without vomiting and had no appetite. There were no urinary symptoms. She had been fairly well but for some headache, and had moved into this house three or four days earlier. On examination the temperature was 37·2° C. (99° F.) and the pulse rate 99. The patient was flushed. The abdomen was flat and soft, the uterus mobile, in good position and of good size, the fornices were clear and the perineum moderately healthy. She showed great fear of her illness, while I had no idea of its cause. As I was leaving she told me that about fifteen days earlier a gimlet had run into her buttock. The site looked healthy.

I was sent for urgently at 11 o'clock the same evening. She complained of faint turns. She did not lose consciousness, but had a dull cold feeling around the heart. She then had a peculiar feeling about the throat and felt a bit stiff about the jaws, both noticed about half an hour earlier, and she also had a touch of pain in the left shoulder and right side of the abdomen. The temperature was 37·1° C. (98·8° F.) and the pulse rate 92. She had very active reflexes, including a jaw jerk.

I took her into hospital with a diagnosis of early tetanus. She was given antitetanic serum at once and sedatives thereafter. She was discharged on December 18. The medical practitioner under whose care she came, disputed the diagnosis on the ground that if it had been tetanus the dose of serum given would have been insufficient.

She reported several times during 1924 for nervousness, and said that she had a big serum reaction while visiting Ballarat during January. By 1925 she had practically recovered from her nervousness. Some considerable time after coming out of hospital she mentioned that two of her male relatives (one her husband's brother) had recently had frank tetanus.

Case II.

Mrs. M., aged sixty-four or sixty-five, was seen on October 22, 1926. Three weeks earlier she was cutting off the tip of a knife with scissors and cut her right thumb with the knife. It bled. She put on pepper to stop the bleeding and the wound healed in a week. It now looked healthy. There was no pain till the day before I saw her. She had a peculiar feeling in the thumb that afternoon, and it became very painful at night, so that she could not sleep. There was no pain on my arrival, but she had had pain before. The peculiar sensation and the pain "came and went", and she had had both during that day. During my visit she had an attack which distressed her. She said that she became shaky that day.

On examination the temperature was 36·2° C. (97·2° F.) and the pulse rate 92. Her jerks were obtained with difficulty. She was given 1,500 units of antitetanic serum. I also opened the finger at the site of the scar, but no discharge was obtained. The incision relieved the pain at first, but then another attack of pain came on. She was given morphine by mouth.

The next day the thumb was examined by X rays and no abnormality was revealed. She was therefore given another 1,500 units of antitetanic serum. The next day she reported a good night, and had no more attacks of pain thereafter.

Case III.

Mr. X, in the thirties, was seen in August, 1930. He had five days earlier run a nail in two places into the left palm, in one place deeply and in the other superficially. There was no discomfort till the last two days, when he

had shooting pains going into the fingers and up into the muscle at the back of the arm as well. He was seen at night and on examination had a temperature of 36·5° C. (97·8° F.) and a pulse rate of 116. There was no increase in his jerks. He was given 500 United States of America units of antitetanic serum into the left arm, while the wound in the palm, in spite of looking healthy, was cleaned and opened up. The next day he reported that he had pain in the fingers and arm about 3 a.m., lasting longer, but not so severe. He thought also that he had some "pullings" in various parts of his other limbs. He had a big local reaction from the serum. He was given 1,500 units more of antitetanic serum (Commonwealth Serum Laboratories) the same morning. He rang up the next morning to report "no more of the pain", less local reaction with the serum, but general reaction of aches and pains. There were no further symptoms.

Reviews.

A BOOK FOR OBSTETRIC NURSES

IN writing a text book for midwifery nurses, it is necessary for the author to remember that many of these nurses have not had a training in general nursing, and Douglas Miller, in his book "Midwifery for Nurses", has kept this fact in mind.[1]

The book contains the usual material given in such books; there are 242 pages in all. He commences with anatomy and physiology. The whole subject is dealt with, yet the minimum number of words are used and the language is simple. The book is written in this style from start to finish, and it is thus suitable for midwifery nurses.

There are not many diagrams, but those given are clear and dictinct; also there are four plates. At the end there is a glossary.

The author has accomplished his object, a suitable text book for midwifery nurses, and it will appeal to those engaged in training and lecturing to them.

RETINAL DETACHMENT.

J. RINGLAND ANDERSON, in his work, "Detachment of the Retina", has produced a book for which the busy practising ophthalmologist should be grateful.[2] In it is found a summary of the opinions of ophthalmologists ranging from those of von Graefe in the year 1854 to the most modern ideas advanced by Gonin.

Opening with a chapter headed "General" it deals successively with the subjects of "Structure and Function of Involved Tissues", "Pathogenesis", "Differential Diagnosis", "Treatment", and "Prognosis". The ideas of various authors are very lucidly presented in condensed form, and dissected.

The very full bibliography shows the tremendous amount of reading and translation involved, and should be of great assistance to research workers wishing to study the original treatises of other authors on the subject.

The diversity of opinions expressed by various authorities both as regards pathogenesis and treatment are excellently demonstrated, and are a clear index of how much of our conception of the physiology of the eye, and of the pathogenesis of the condition commonly known as spontaneous or idiopathic detachment of the retina, is speculative at the present time.

Practising ophthalmologists cannot fail to benefit from a perusal of the various theories so clearly and exhaustively set forth under the heading of "Pathogenesis".

Under the heading "Treatment" a description of non-surgical methods is followed by a full description of the numerous and various surgical procedures advocated at different periods by many authorities, whose aims and objectives are classified by the author under six headings. The last of these is Gonin's operation, the objective of which is to close the tear or hole in the detached retina, which he claims is invariably present. Stress is laid upon the importance of and difficulty in finding and localizing these, and the various methods of localizing and projecting the tears or holes, when found, are described.

The description of the various surgical procedures that have been advocated, demonstrates the desperate nature of the condition; and, while the claims of some authors have not been substantiated, the author leaves us with a substantial hope that Gonin's operation may give a reasonable percentage of lasting cures in selected cases.

THE STOMACH AND ITS ACIDITY.

"GASTRIC ACIDITY", by John D. Robertson, Chemical Pathologist to the Middlesex Hospital, is a small book of fifty pages, containing an account of the author's work on the vexed question of the relation of lactic acid to carcinoma and other conditions of the stomach. The first half of the book is historical, with a wealth of references, and is the best review of the literature we have seen; there are many quotations from original works.

The author's work seems to prove completely that lactic acid in the stomach is produced by fermentation and not specifically by carcinoma. Isolation of the zinc salt of the acid and examination of its rotation puts out of count any possibility that the acid is produced by metabolism of animal cells. Further, although lactic acid is usually present in carcinoma of the stomach, its appearance is not an early sign, and when it is present the growth is usually too far advanced to be amenable to therapeutic measures. It is also present in other, especially obstructive conditions. "The qualitative tests for lactic acid are so easily influenced by so many substances that no reliance can be placed upon them. This is true when the tests are performed on the resting juice and also on the later specimens."

This little book should be read by all those interested in gastric conditions; to those who wish to inquire more deeply into clinical problems, it will be found an excellent model of how an investigation should be carried out.

GONORRHŒA.

THE motto of Dr. Marta's manual, "*Nisi casti . . . canti*", reveals at once the author's purpose.[2] He writes for the educated lay public, not a primer, but a text book illustrated with diagrams, fortified by statistics and lightened with an historical introduction. One is surprised to read that 70% of all German university students suffer from infection and that every man who marries after thirty years in Germany has had the disease at least twice. The subtitle of the book, therefore, is "*il male più diffuso*".

In the first chapter the story of gonorrhœa is traced "from Moses to Neisser". Thus we learn that Galen first named the malady "gonorrhœa", that the great Augustus knew its secret pangs, and even Tiberius harboured all unknowing the then anonymous coccus. Cicero's eloquence was poured out in depicting the agonies of painful

[1] "Midwifery for Nurses", by Douglas Miller, M.D., F.R.C.S., M.R.C.P.; 1931. London: Edward Arnold. Crown 8vo., pp. 263, with illustrations. Price: 6s. net.

[2] "Detachment of the Retina: A Contribution to the Study of Its Causation and Treatment", by J. Ringland Anderson, M.B., B.S., F.R.C.S., F.C.S.A., D.O.M.S., with foreword by Sir J. H. Parsons; 1931. London: Cambridge University Press. Royal 8vo., pp. 221, with illustrations. Price: 20s. net.

[1] "Gastric Acidity: An Historical and Experimental Study", by J. D. Robertson, M.D.; 1931. London: John Murray (for the Middlesex Hospital Press). Demy 8vo., pp. 82.

[2] "Gonorrea (Blenorragia) il Male Più Diffuso, Difesa Sociale e Personale", by F. Marta; 1932 (*sic*). Malin: Ulrico Hoepli. Foolscap 8vo., pp. 291, with illustrations.

urination. Of remedies, oil of scorpions was fashionable in the middle ages, but men living in the fifteenth and sixteenth centuries were not denied the consolation of silver nitrate injections. Fallopius took a cheery view of the ease with which an infected world could be rid of this scourge. But his optimism and his method alike have passed into the limbo of forgotten creeds. Hunter, who pushed his enthusiasm for knowledge so far as to make an auto-experiment in venereal infection, died still believing the two venereal diseases identical. It was left for the flamboyant Ricard to differentiate them and to leave for posterity an excellent description of both maladies and many unquotable anecdotes.

In a very practical section, the methods of prophylaxis, ancient and actual, are described with careful detail. The moral question involved is not discussed. Dr. Marta accepts the view that neither moral nor religious training is sufficient, in general, to bridle hereditary instinct or curb the sexual passion. All ignorance, he writes, is dear, but none so costly as ignorance of venereal disease. So he takes up the old war cry of Potain, of the Paris faculty: *"Guerre à la blenorrhagie!"*

The new penal code of Italy prescribes a punishment of from one to three years for anyone proved to have transmitted gonorrhœa. A new spirit seeks to elevate the race physically and mentally, and Dr. Marta's excellent book is one expression of it. It is to be hoped that an English translation will be shortly available.

HUMAN PHYSIOLOGY.

PHYSIOLOGISTS of the younger generation at University College, London, have produced an elementary text book of unique quality.[1] Dr. F. R. Winton and Dr. L. E. Bayliss remark in the preface that the medical student, for whom their book is primarily intended, is expected to know too much and to think too little. In conformity with this belief, they have made a praiseworthy attempt to avoid the sterile dogmatism of the ordinary elementary text book, and to encourage a rational appreciation of the assembled facts. They have summarized modern physiological knowledge with no little success, but in a manner which renders the title, "Human Physiology", somewhat of a misnomer. It is rather an introduction to mammalian physiology, in which a certain stress is laid on the reactions of *Homo sapiens* which are susceptible to observation and experiment. Such a treatment is essential for the teaching of physiology. The student must know how the individual mammal works and, as far as possible, why it works, before he is justified in devoting his energies almost entirely to the study of human physiology. It is of great importance that the student should realize that the greater part of physiological knowledge has been derived from observations on subjects other than man. He must learn to assess how far such knowledge can be applied to the human subject without radical modification, and so he should know how this fundamental information has been obtained.

The authors have devoted considerable attention to the experimental methods by which problems have been clarified, and have not hesitated to discuss the pros and cons of the deductions on which current conceptions are founded. It is too often considered dangerous to allow the junior student to be more than a receptacle for what are at the moment given the status of eternal truths. The reading of an elementary text book whose authors consider that medical students should be taught to weigh the evidence for what they are expected to believe, is a refreshing experience.

The space devoted to individual sections may not please some critics. The mechanics of muscular contraction and the phenomena of conduction in nerve fibres receive detailed treatment, while the vitamins are dismissed in a brief summary and, in keeping with the best traditions of physiological text books, the question of temperature regulation and the effect of external environment on the working of the organism are passed over in a cursory manner. The omission of a description of the minute anatomy of the spinal cord and brain stem seems to establish a precedent which may well be followed by the compilers of other physiological text books. Such purely anatomical information can be obtained from the appropriate sources, which never fail to catalogue the functions of the individual fibre tracts. The space saved by this omission is much more profitably devoted to a discussion of the relatively meagre knowledge of the functional characteristics of reflex arcs, conditioned reflexes and the control of posture.

The presence of a bibliography composed largely of references to easily accessible monographs, is most valuable. It indicates a conception of the function of the elementary text book which is not sufficiently common. Such books should bring the reader into touch with scientific literature and not pretend to be in themselves sufficient.

The work is a valuable contribution to the roll of elementary text books. From it the reader should be able to pass directly to monographs and original papers without traversing any of the more comprehensive advanced works.

[1] "Human Physiology", by F. R. Winton, M.D., and L. E. Bayliss, Ph.D., with a Chapter on The Physiology of the Sense Organs, by R. J. Lythgoe, M.D., and a Foreword by C. Lovatt Evans, D.Sc., F.R.C.P., F.R.S.; 1930. London: J. and A. Churchill. Royal 8vo., pp. 598, with 227 illustrations. Price: 15s. net.

THE MENTALLY DEFICIENT AND THEIR NURSING.

IN October, 1929, a Committee of the Royal Medico-Psychological Association commenced the preparation of a hand book for the education of workers in mental deficiency. The "Manual for Mental Deficiency Nurses" is the result.[2] Some of the material is naturally based on the well known "Handbook for Mental Nurses", but the inclusion of adequate matter relating to the problem of the defective has entailed a complete revision. The authors are to be congratulated on their labours, which have resulted in what will be undoubtedly the standard work for all nurses and attendants of mental defectives. The amount of valuable information compressed into more than 500 well printed pages is remarkable, and the student will find an adequate basis, not merely for his specialty, but for the general principles of nursing, anatomy, physiology and disease. For those who wish to read more deeply, useful bibliographies have been inserted. A comprehensive index adds to its value as a work of reference.

In no sense is the work a "cram book". The chapters are written in an interesting vein, and are aptly illustrated. That the mental defective should be treated as an individual in order to bring out latent talents is rightly stressed. Adequate diagnosis and special training for the problem child go hand in hand. The chapters on these topics deal at length with intelligence testing, sense training, manual training, physical training, teaching of the three R's, industrial training and community care. In the above connexion the book might be read with benefit by any parent unlucky enough to have a defective child.

The opening chapter is devoted to the general duties of nurses, who in this branch should possess character qualifications of a high order. Whilst the same may be said of all nurses, it is probable that discretion and patience are more needed in the care of defectives than in the care of those who possess a normal mental equipment. From this point of view alone, a book which deals so adequately with their training is opportune and will be welcomed by all who are interested in the problems of mental retardation. The Medico-Psychological Association is to be commended for its enterprise.

[2] "Manual for Mental Deficiency Nurses", by authority of the Royal Medico-Psychological Association; 1931. London: Baillière, Tindall and Cox. Demy 8vo., pp. 532. Price: 6s. net.

The Medical Journal of Australia

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

RADIUM AND CANCER.

THE purchase by the Commonwealth Government of a quantity of radium and its use in several centres for research purposes and for treatment of patients suffering from malignant disease have stimulated the interest of medical practitioners and raised the hopes of the suffering public. The papers read at the Second Canberra Cancer Conference and published in this journal show that useful work is being done. Many surgeons have mastered the details of the technique of radium application, they are learning from experience what radium may be expected to achieve, and are obtaining results which at the lowest estimate may be described as encouraging. The results of radium treatment reported in reputable journals from other parts of the world, particularly from France and Scandinavia, and the accounts given by Australian practitioners who have studied overseas, must be accepted and should in certain circumstances be used as a basis for future investigation and treatment. The ultra-conservatism of such surgeons as Mr. Victor Bonney, of the Middlesex Hospital and the Chelsea Hospital for Women, is to be deprecated. Mr. Bonney, in *The Lancet* of February 8, 1930, wrote: ". . . radium therapy, the present estimate of whose value in this connexion is founded solely on figures from abroad. Not until the results of reliable workers in this country are available shall we be in a position to properly appraise its effects, for it does not follow that the same measure of success attending a method of treatment in one country is necessarily attained when it is carried out in another country." While this type of conservatism is supposed to be typical of British as opposed to Continental and American medicine and that of the British Dominions, it is, we venture to believe, not so prevalent in Great Britain as it was in days gone by. The old-time advice to "prove all things" can be carried too far, if by giving much time to proof, progress is impeded or sufferers from disease are denied therapeutic measures declared and shown to be effective in foreign parts. It is therefore the duty of medical practitioners in Australia to make themselves acquainted with what is being done abroad.

The Medical Research Council of Great Britain his issued a further (ninth) report on the medical uses of radium.[1] The report is the work of the Radiology Committee of the Council, acting jointly with the British Empire Cancer Campaign. It is a summary of "research work in the treatment of cancer" done during 1930 by means of radium salt entrusted by His Majesty's Government to the Medical Research Council. The investigations have been carried out in various centres and the report has been compiled from results obtained from five of these; the results of treatment by other means than radium have been included. The total number of patients with malignant disease seen during 1930 was 1,247. Of these 1,016 or 81·5% received treatment; in the remaining 18·5% of patients the disease was in such an advanced stage when advice was first sought that none but palliative measures were possible. Surgical operation alone was used in 403 cases, radium alone in 450, X rays alone in 35, surgical operation *plus* radium in 68, surgical operation *plus* X rays in 27, radium *plus* X rays in 26 and surgical operation *plus* radium *plus* X rays in seven. Surgeons who practise radium therapy will study the report in detail. Mention will be made in this place only of certain points of interest and of general conclusions.

[1] "Medical Uses of Radium: Summary of Reports from Research Centres for 1930", Medical Research Council of the Privy Council, Special Report Series, Number 160.

The statement is made that the probability of success with radium treatment depends largely on the site of the disease and, in any particular case, upon the early or late manifestation of the growth. This has been emphasized in other reports. Radium finds its most suitable field in growths of the breast, *cervix uteri* and in the buccal cavity. There appears, however, to be as much difficulty in England as in other parts of the world in bringing patients under treatment while the disease is in an early stage. Thus, in the General Hospital, Birmingham, of 40 patients treated with radium for cancer of the breast, only seven were in an early operable stage. From the meagre details of the report it is not possible to judge how radium is regarded as opposed to surgical operation. At the same time it is stated that at the Middlesex Hospital patients with cancer of the breast are sometimes treated by surgical operation alone. It would be interesting to know what criteria are adopted at this hospital in deciding on the use of radiation; the report is silent on this point. In the absence of information it would be unfair to suggest that this attitude is the result of ultra-conservatism. Although, in dealing with such a cancer as an atrophic scirrhus in an elderly woman, radiation either before or after operation may not be regarded as necessary, few surgeons will deny that post-operative radiation at least makes metastasis less likely to occur. At University College Hospital "radium is only used in inoperable cases and operable cases in which operation is contraindicated by age or intercurrent disease". In the radium treatment of cancer of the uterus both the Stockholm technique and the Paris technique have been used. An interesting table of treatment extending over nine years at six centres shows that 71 patients with operable cancer of the cervix are living and 39 are dead; 87 with "borderline" cancer are living and 144 are dead; 212 with inoperable cancer are living and 694 are dead. The larger number of these patients were treated during the last four years. Interesting details are given of the results of treatment of cancer of the mouth, naso-pharynx, larynx and œsophagus; cancer of the rectum, bladder, prostate and penis; brain tumours, carcinomata and lymphosarcomata.

The general conclusion of the series of reports is that "while radium has a recognized place as a therapeutic agent in cancer, its exponents have to rely to a very large extent upon the selective action of the radiation used, for, up to the present, no method has been discovered by which malignant cells can be made more radiosensitive, if we except the variations of the time factor". Not many will agree with the statement that the place of radium in cancer treatment is recognized. The recognition varies with the training, the experience and the predilection of the surgeon. The man who, as Professor Murdoch states, has "closed his ledger" owing to advancing age and who is no longer able to embrace new teachings and adopt a new point of view, is difficult to convince and even adamant in his refusal to be convinced. The young enthusiast is just as difficult a person. General recognition of the place of radium in cancer treatment will not be gained until the matter is put beyond dispute by overwhelming evidence in one or other direction, probably not until the cause of malignant disease is discovered. For the latter part of the statement in the general conclusion, attention must be drawn to the ignorance that exists in regard to the nature of radio-sensitivity. This is a matter for physio-chemical research. Even if the sensitivity of a cell to radium could be altered, the question of the type of radiation to be used would remain. Sydney workers have shown that certain types of cell can be affected in various ways by radiation of different wave lengths. Research must extend both into the action of different types of radiation and into the physico-chemical constitution of the animal cell, malignant and non-malignant. At the same time, unless radium treatment of cancer is accompanied by the most detailed examination of the cancer itself and of its host, and by meticulous care in recording the technique adopted in radiation treatment, much of the so-called clinical research will be valueless.

Current Comment.

MENINGOCOCCÆMIA.

There has been some controversy regarding the possible paths to the meninges taken by the causal

organism of cerebro-spinal fever. Within recent years many observers have reached the conclusion that the meningococcus is borne by the blood stream; this view is supported by bacteriological findings. For example, it has been shown that the organism can be recovered from the blood in many instances before the clinical onset of meningitis. Still, its presence in the blood may be purely incidental and does not necessarily indicate either that the infection is carried by the blood to the meninges or that the condition is one of meningococcal septicæmia. That septicæmia does occur is undoubted. In 1915 Coles showed that it was possible to demonstrate meningococci in direct blood smears. Some authorities believe that the disease is essentially a septicæmia and that the purulent meningitis is a pyæmic manifestation. There seems little doubt that meningococcal septicæmia may occur without meningitis.

An interesting feature of cerebro-spinal fever, and one that has been a source of confusion in diagnosis, is the purpuric rash that occurs in some 25% or more of cases. It has been shown by several observers that the organisms may be observed in smears from the skin lesions. In a recent paper Stafford McLean and John Caffey draw attention to this fact and discuss the results of their investigations into purpuric lesions of children suffering from meningococcal infection.[1] In thirty-two of 283 instances of meningococcal disease purpuric lesions were to be seen. Smears were made from the lesions in eighteen instances. Usually it was noted that there were considerably more polymorphonuclear leucocytes present in the smear than would normally be observed. McLean and Caffey do not state definitely whether the numbers were greater than would be expected from a consideration of the leucocyte count of the blood, but they point out that Brown observed inflammatory changes in the skin lesions, and they believe that the preponderance of polymorphonuclear cells is due to local inflammatory reaction. Gram's method of staining was employed; meningococci were regarded as absent unless diplococci were found within polymorphonuclear leucocytes.

Meningococci were found in 83% of the cases in which smears from the purpuric lesions were examined; attempts at blood culture were successful in 68% of cases. On no occasion did examination of smears from the lesions fail to reveal organisms when the blood culture was successful; but attempts at blood culture sometimes failed when meningococci were found in the lesions. In two of four cases in which meningococci were revealed by examination of the purpuric lesions, attempts at culturing the organisms from the cerebro-spinal fluid were unsuccessful. It should not be concluded from this that examination of direct smears is the most reliable diagnostic method, nor that in some instances meningococci are present in skin lesions and absent from the blood; there are several sources of fallacy, and further investigation is necessary. It is of interest to note that organisms were found in smears from the skin lesions and cultured from the blood of the two patients whose cerebro-spinal fluid was apparently sterile.

McLean and Caffey are unable to explain why purpura develops in some cases of meningococcæmia and not in others. Brown suggests that the lesions may be due to such factors as the extensive capillary bed in the skin, the slower circulation, and the provision in the skin of an optimum temperature for the growth of the meningococcus.

The symptoms of the children suffering from purpura were not different from those of the other children infected with the meningococcus; but it was observed that there was a higher percentage of fulminating cases among those affected with purpuric lesions. The mortality rate was higher among children suffering from purpura. In some instances there were no obvious clinical signs of meningeal irritation, even though organisms could be found in the cerebro-spinal fluid. There is an explanation for this apparent anomaly in those cases in which the disease is of the fulminating type; for the infection may be so virulent as to overwhelm its victim and rapidly kill by the development of a profound toxæmia.

Post mortem examination revealed hæmorrhages in various tissues and organs. In several instances there had been hæmorrhage into the suprarenal glands. This lesion may be so destructive as to inhibit the supply of adrenalin and may thus be an important factor in the cause of death. McLagan and Cooke believed that suprarenal hæmorrhage precipitated early death in their series of cases of malignant cerebro-spinal fever; they were impressed with the therapeutic value of adrenalin. McLean and Caffey suggest that in treatment there is need for a potent extract of the cortex as well as the medulla.

There are many other features of interest in the paper, which deals with general observations on meningococcal infection in childhood as well as the special investigation of the purpuric lesions. The most important point brought out is the ease with which diagnosis can usually be made when purpura is present. The simple procedure should be especially useful to quarantine officers. The symptoms of cerebro-spinal fever are not always easy to interpret; when meningococcal blood infection occurs without meningeal involvement, diagnosis by purely clinical methods is impracticable, unless there is a history of contact. On more than one occasion cerebro-spinal fever has been confused with typhus. Of course, microscopical examination of a smear from a purpuric lesion is not infallible; but it offers the hope of a ready relief from diagnostic difficulties, and is worthy of regular employment. Incidentally, McLean and Caffey remark that in 12·5% of their cases it was the only method by which an immediate bacteriological diagnosis could be made. There is need for further investigation into the histological character and the cause of the purpuric lesions.

[1] *American Journal of Diseases of Children*, November, 1931.

Abstracts from Current Medical Literature.

RADIOLOGY.

Comparison of Intravenous and Oral Cholecystography.

S. J. HAWTERY (*American Journal of Roentgenology*, August, 1931) gives a comparison of the results obtained in approximately two hundred and fifty cases, each after oral and intravenous administration of sodium-tetraiodo-phenolphthalein. The author found that there was practically no difference between the accuracy of the two methods and has discontinued the use of the intravenous method, even for checking the results of the oral method.

So-Called Calcifying Subacromial Bursitis.

J. B. CARNETT (*Radiology*, September, 1931) states that the calcified masses which are commonly thought to occur in the subacromial bursa actually are situated not in the bursa, but beneath its floor, in, on, or even under the supraspinatus tendon. There is only one bursa present, and this is subacromial; there is no subdeltoid bursa. The term bursitis is a misnomer, since the symptoms are caused by the tendon lesion. The pathological lesions consist of tendinitis, necrosis of tendon, and deposition of calcium, and the lesion is due not to a single acute trauma, but to the innumerable small occupational traumata resulting from pinching the supraspinatus tendon between the humeral head and the acromion process or coracoacromial ligament. After an acute attack of pain, the deposit may undergo spontaneous absorption, and skiagrams taken several weeks after the attack may fail to show the deposit which caused the attack. In 25% of cases these deposits are bilateral. The finding of a deposit in the symptomless side only in a patient who had passed through an acute attack several weeks earlier, suggests that originally he had bilateral deposits with subsequent spontaneous absorption in the painful shoulder. The milder degree of the condition may occur in the absence of a demonstrable deposit, probably due simply to inflammation of the tendon. In order to throw the deposit shadow clear of the bone shadow, skiagrams should be taken in full external rotation and in full internal rotation of the head of the humerus, and the central ray should be directed slightly caudally and laterally, usually about 10° from the vertical in each direction.

The Bone and Joint Changes of Leprosy.

W. CHAMBERLAIN, W. WAGSON AND L. GARLAND (*Radiology*, November, 1931) describe the bone and joint changes in leprosy. These changes occur in the bones of the hands and feet. Bone absorption is the most constant finding; this varies from slight metaphyseal narrowing to diffuse diaphyseal absorption. Complete disappearance of one of the phalanges may occur. The absence of any bone production is a conspicuous feature. When joint involvement occurs, there is usually considerable destruction of the joint, with well marked erosion of the adjacent bone; in some cases bony ankylosis may take place. The authors consider that the bone changes are not specific, but are of neurotrophic origin. Besides the actual neurotrophic factor, inflammatory changes and repeated trauma influence the deformities; hence the feet are usually more affected than the hands.

Peptic Ulcer of the Œsophagus.

J. RICHARDS AURELIUS (*American Journal of Roentgenology*, November, 1931) gives a description of peptic ulcer of the œsophagus and reports a case. He considers that the preponderance of ulceration in the lower third of the œsophagus would seem to indicate more than a casual relationship between the acid gastric secretions and œsophageal ulceration, and that the ætiology of these ulcers is probably similar to that of gastric ulceration. The most prominent symptoms are pain, dysphasia, vomiting, hæmorrhage and perforation. X ray examination may reveal the ulcer crater due to retention of a small fleck of barium. This should be checked by a second examination; but if it is constant, it is almost pathognomonic. These ulcers may cause varying degrees of associated spasm. This may take the form of a simple transient defect causing retardation of the meal, a tapering defect towards the cardiac end, or even a localized incisura as seen in gastric ulcers.

Lobar Pneumonia.

WALTER H. UDE (*American Journal of Roentgenology*, November, 1931) analyses the X ray findings in early lobar pneumonia and shows that in all these early cases the consolidation assumes a conical distribution, with the base of the cone towards the periphery. The periphery may be lateral, anterior or posterior. The triangular areas of consolidation whose bases are directed laterally, are best seen in the antero-posterior view, but when the consolidation extends posteriorly or anteriorly, a lateral view is essential. The author shows by the study of lateral views that the term "hilum" or "central" pneumonia, used to describe these areas of consolidation seen in the antero-posterior view in the hilar region, is a misnomer. These medial shadows are really of cone-shaped consolidations extending posteriorly, which may best be defined as "early postero-medial" consolidations.

Linitis Plastica.

W. R. BROOKSHER (*Radiology*, December, 1931) discusses *linitis plastica* and gives a long series of histories of patients. He concludes that *linitis plastica* is an atypical fibro-carcinoma. It is characterized by an extensive pathological increase of connective tissue in the gastric walls, most pronounced in the submucosa and in the *muscularis mucosæ*, containing cells (frequently isolated cells only) of a malignant nature. The author considers that the term *linitis plastica* is worthy of retention as descriptive of the gross deformity, but, from the pathological point of view, fibromatosis or carcinoma, diffuse or local in its extent, would be more suitable.

Pulmonary Asbestosis.

J. V. SPARKS (*Radiology*, December, 1931) describes a type of pneumonokoniosis due to the inhalation of asbestos fibres by workers in asbestos factories. Clinically the condition resembles silicosis, and radiologically a diffuse fibrosis is seen, of a rather finer type than that which occurs in silicosis. The small asbestos fibres can be recognized microscopically in the sputum. The prognosis is grave, and once the asbestos bodies appear in the sputum, the course of the disease would appear to be progressively downwards. Cessation of exposure to the dust is of no avail in checking the spread of the disease process.

Osteitis Fibrosa Cystica.

ARTHUR R. BLOOM (*Radiology*, December, 1931) reports a case of *osteitis fibrosa cystica* associated with an adenomatous condition of the parathyreoid glands. There was pronounced improvement, as evidenced by the X ray appearance of the bones after surgical removal of the affected glands. However, the author concludes that the whole question of the relationship of hyperparathyreoidism and *osteitis fibrosa cystica* is far from settled.

Chronic Ulcerative Colitis.

J. ARNOLD BARGIN AND HARRY M. WEBBER (*Radiology*, December, 1931) state that chronic ulcerative colitis may attack all or any part of the large intestine. Among the predisposing factors are infection of the upper respiratory tract, acute contagious diseases, and distant foci of infection. The actual organism appears to be a diplostreptococcus closely resembling the pneumococcus, but possessing morphological and biological characteristics. The condition is not a form of bacillary dysentery. If the disease is not of long standing, there may be no radiological evidence, or the only sign may be extreme hyperirritability. In about 20% of cases the lesion is confined to the rectum, which is markedly narrowed. In a skiagram the appearance is suggestive of a series of linear strictures, due to the retention of barium in the folds of the contracted bulbous ampulla. In a well advanced case the barium enema flows very rapidly back to the caecum and generally

through into the terminal part of the ileum. The colon is considerably reduced in size and becomes changed from a soft, thin-walled, haustrated tube into a stiff, thick-walled, straight pipe with a small lumen. Occasionally markedly contracted areas may be seen, due to organic strictures or to localized spasm. If the ulceration of the mucous membrane is superficial, the outline of the colon may be quite smooth, but if it is deep, the outline has a furry or moth-eaten appearance. There may occur localized areas of chronic ulcerative colitis in isolated segments of the colon without involvement of the distal segments and rectum.

PHYSICAL THERAPY.

Irradiation of Tumours.

MAX KAHN (*Radiology*, October, 1931) discusses irradiation of tumours, and bases his remarks on an experience of nearly eight years. Most of his experience was obtained in the treatment of tumours observed both by Dr. Bloodgood and himself, and the diagnosis was based on clinical, X ray or microscopical evidence. The present review is chiefly of tumours considered inoperable. As a rule, the more malignant the tumour, the more radio-sensitive it is likely to be; for example, lymphosarcoma and certain other types of sarcoma—embryonal cell sarcoma. Fibromata or fibrosarcomata belong to a type of tumour more or less radio-sensitive, and while some of them will yield to irradiation and the patient remain clinically well for five years or more, others are only temporarily benefited, recur, and have to be surgically removed. Tumours of this type, therefore, fall in the group of moderate curability, and it is always advisable to try irradiation before operation. One patient with fibromyxoma of the antrum and nares, and another with fibromyxosarcoma involving the antrum and ethmoidal region, treated with deep X ray therapy, are, up to the present time, clinically well at two and two and a half years respectively. The author draws attention to the fact that the highly malignant tumours do not necessarily offer a bad prognosis. He desires to emphasize that deep irradiation offers much hope in some types of malignant tumours, and that irradiation is the method indicated for those in which the location of the tumour makes the lesion inoperable or its complete removal impossible.

Radiotherapy in Chronic Myelogenous Leuchæmia.

ROY G. GILES (*Radiology*, October, 1931), writing of chronic myelogenous leuchæmia, states that modern treatment is directed not only toward the secondary anæmia, but toward the leuchæmia. The general management of patients suffering from chronic leuchæmia should include the best possible hygiene, outdoor life, with its fresh air and sunlight, and exercise regulated to the strength of the individual patient. Spontaneous remissions occur normally, but rarely in chronic myelogenous leuchæmia. Splenectomy was the first measure in the treatment of leuchæmia. Radium or X ray therapy was later used prior to the operation to reduce the numbers of white blood cells and the size of the spleen. The mortality rate was lower in the cases of myelogenous leuchæmia prepared by radium or X rays before the removal of the spleen, than the average for splenectomy in general. The action of Röntgen and radium rays upon the normal circulating blood consists of an initial leucocytosis bearing chiefly on the polymorphonuclear cells. The leucocytosis lasts for from a few hours to two or three days, and is followed by a leucopenia which steadily increases and lasts for from two to four days. In the treatment of leuchæmia, the great capacity of irradiation to destroy lymphocytes and to produce leucopenia is valuable, because the leucocytosis produced by this disease can thus be greatly reduced. The treatment is largely concentrated on the spleen in the myelogenous type, but if this is not sufficient, the effect can be increased by treating the marrow of the long bones. Every case of myelogenous leuchæmia has its own peculiarities with regard to severity, rapidity of change, and response to treatment. The blood picture and the general condition of the patient should be observed before each application of X rays or radium. The frequency of irradiation is a very important factor in the treatment of leuchæmia, and the leucocyte count should not be depressed below twenty or thirty thousand per cubic millimetre. Leuchæmic patients develop a tolerance to irradiation, and as time goes on, more penetrating rays, longer course of treatment, and longer intervals between treatments are necessary. There is as yet no optimum dose of X rays or radium for the correct treatment of leuchæmia, each therapist emphasizing his individual technique, almost to the exclusion of all others. The author advises moderate doses of X rays, repeated at intervals, as indicated by the leucocyte count and the general well-being of the patient. In the light of present therapeutic measures leuchæmia has a natural progression to a fatal end, in spite of all treatment. In the acute cases death occurs in a few months, whereas carefully observed chronic cases lasting ten years are on record. The average duration of life is two and a half years. Splenectomy does not modify the evolution of the disease, and for this reason is not superior in its effect to irradiation. Irradiation brings the blood formula to or near normal for a longer or shorter period, whereas, following splenectomy the blood count remains qualitatively leuchæmic. Irradiation of the spleen has been considered the most effective therapy of chronic myeloid leuchæmia since Senn, in 1903, observed that Röntgen irradiation effected a reduction in the enlargement of the spleen and an improvement in the blood picture. Renewed irradiations will improve the recurrences. Radium or X ray treatments cause more or less replacement by connective tissue; the spleen develops a resistance to irradiation, and, finally, the radiotherapy becomes entirely ineffective. The smallest effective dose should be determined and used until observation shows that a heavier form of irradiation is indicated. There is the greatest need for an optimum dose for the correct treatment of myelogenous leuchæmia.

The Radio-Sensitivity of Pharyngeal Tumours.

HAYES E. MARTIN AND OTTO H. PELUEGER (*Radiology*, September, 1931) discuss the radio-sensitivity of pharyngeal tumours. They open their article by stating that the specific histological structure of a given tumour is generally considered the most reliable index to its radio-sensitivity, and that this is ordinarily true; but the wide variation in radio-sensitivity among histologically similar tumours indicates that there are other factors not as yet discernible by microscopical examination. The authors have been impressed by the fact that tumours in certain situations will generally react similarly, despite their different histological structure. Pharyngeal tumours in general are often more radiosensitive than those of the adjacent oral cavity, intrinsic larynx, or œsophagus. This fact has stimulated investigation from the histological standpoint, with the result that such radio-sensitive subgroups of epidermoid carcinoma as lympho-epithelioma and transitional cell carcinoma, have been differentiated as clinical and pathological entities. These tumours occur most frequently in the pharynx, and, according to percentage figures given by Ewing, and Quick and Cutler, comprise about 16% of all pharyngeal growths. All writers stress the pronounced radio-sensitivity of transitional cell carcinoma and lymphoepithelioma, but the authors believe that this emphasis has obscured the fact that radio-sensitivity is common to all pharyngeal tumours and is not entirely confined to any histological variety. In support of this view they submit cases chosen to illustrate that squamous carcinoma and adenocarcinoma (of salivary gland type) of the pharynx may respond as well as or even better than certain of the more anaplastic varieties. The authors summarize their remarks by saying that the radio-sensitivity of pharyngeal tumours is a quality common to all pharyngeal tumours, and is not a special characteristic of such well known histological varieties as lympho-epithelioma and transitional cell carcinoma, which are also most commonly found in the pharynx. This phenomenon cannot be explained on the basis of the histological structure.

Special Articles on Aids to Diagnosis.

(Contributed by Request.)

XV.

THE CLINICAL SIGNIFICANCE OF LABORATORY TESTS IN THE DIAGNOSIS OF HYDATID DISEASE.

THE application of laboratory tests to the investigation of patients suspected of harbouring hydatid cysts has greatly increased the accuracy of preoperative diagnosis in this disease. The tests commonly in use are the examination of hydatid material derived from the patient, the determination of the presence or absence of eosinophilia, the intradermal injection of hydatid fluid and the complement fixation test of the serum in the presence of hydatid antigen. When the results of these tests are intelligently applied, the diagnosis of hydatid infestation will be correct in at least 90% of cases.

The Examination of Material Derived from the Patient.

The presence of laminated membrane, scolices or hooklets, (Figures I, II and III) in the sputum, the urine, the fæces or in other discharges from a patient, is pathognomonic of hydatid infestation. Search should be made for these elements whenever there is a possibility that a cyst has ruptured into the respiratory, urinary, biliary or alimentary tracts. The patient frequently describes the semi-transparent membrane in sputum or urine as "grape skins". Following rupture of a cyst into the biliary passages, pieces of bile-stained membrane may be found in the stools after washing them through a sieve. The lamination may be evident in only a portion of the membrane if its source is a suppurating or degenerated cyst or if it has been partly digested.

Diagnostic puncture of an hydatid cyst is contraindicated because of the risk of anaphylaxis, of secondary echinococcosis and, in the case of pulmonary infestation, of rupture of the cyst into the bronchial passages. Hydatid fluid is clear and contains a small amount of coagulable protein and about 0·6% of sodium chloride. Scolices or hooklets may be found in the sediment after centrifuging. In their absence the nature of the fluid may generally be confirmed by using it as an antigen for complement fixation or intradermal tests, though some hydatid fluids have no antigenic properties.

Eosinophilia.

An eosinophilia of more than 300 eosinophile leucocytes per cubic millimetre of blood is found before operation in about one half of the patients infested with the hydatid parasite, while in about one-third the eosinophile leucocytes exceed 500 per cubic millimetre. Though it may occur in many other conditions, eosinophilia not infrequently directs attention to the possibility of hydatid infestation and should lead to further investigation.

The Intradermal (Casoni) Test.

This test requires special care in technique and in interpretation if reliable results are to be obtained. The reagent in general use is pooled hydatid fluid derived from uncomplicated cysts of sheep, fluid containing scolices being usually selected. Its sterility is insured by filtration. Its antigenic properties are retained for many months, even at room temperature.

The skin of the outer half of the upper arm is most suitable for the test. If the patient has been tested before, a fresh area of skin should be used so as to avoid a fallacious response from local sensitization.

The fluid is injected intradermally in amount sufficient to raise a white area approximately one centimetre in diameter. Usually about 0·25 cubic centimetre (four minims) of the fluid is required. For controls a similar injection of normal saline solution (0·9%) is made a few centimetres away and the skin of the other arm or forearm is stroked moderately firmly with a blunt instrument (the stroke test).

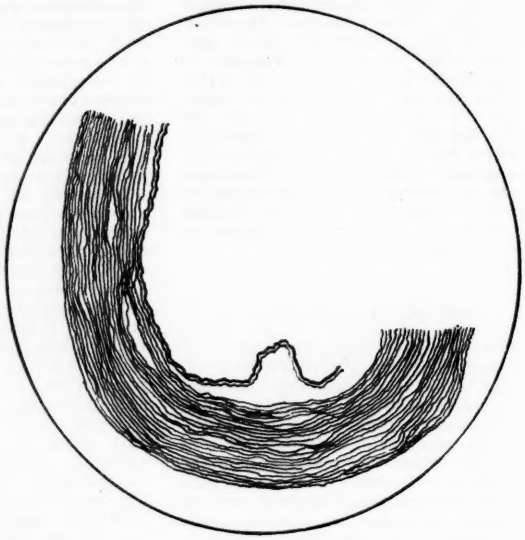

FIGURE I.
Membrane from a cyst of *Echinococcus granulosus*. × 250.

The Immediate Reaction.

In a typical immediate reaction the control wheal fades rapidly, while that from the hydatid fluid increases and usually shows pseudopodial outrunners. A zone of erythema surrounds the wheal, which reaches its maximal dimensions within half an hour and then fades quickly. The greatest diameter of the wheal is measured from the extremity of one outrunner, and a second measurement is taken approximately at right angles to the first.

Reactions are recorded as positive when the wheal measures at least 2·4 centimetres in one diameter or 2·2 centimetres in both diameters. Doubtful reactions are those in which both diameters are from 2·0 to 2·2 centimetres or in which the smaller diameter is less than 2·0 centimetres while the larger lies between 2·2 and 2·4 centimetres. In these the test should be repeated. Failure to react is recorded when the wheal is smaller than the measurements given above.

If the wheal from the control injection reaches the dimensions of a doubtful reaction, a positive result with the hydatid antigen must be disregarded.

The normal response to the stroke test consists of a red line confined to the area of pressure followed within half a minute by a spreading flush. Swelling and wheal formation over the line of the stroke are characteristic of factitious urticaria. When this condition is present an immediate reaction with the intradermal test has no significance.

Further investigation is required to interpret the significance of doubtful or positive reactions following the injection of hydatid fluid. The possibility of past or present infestation with other helminths should be considered. If such be proved, a positive result with the intradermal test must be disregarded. Very uncommonly a patient may be sensitive to sheep serum protein. This fallacy may readily be excluded by an intradermal injection of dilute sheep serum; if this causes a reaction, the intradermal test should be repeated with hydatid fluid derived from another host.

The presence or absence of generalized skin disease, pruritus, urticaria, angioneurotic œdema, hay fever and asthma should always be recorded. When any of these is present, the results require very careful interpretation, since some fallacious reactions have been recorded under these conditions.

The above standards being used, a positive immediate reaction will be found in about 75% of patients with hydatid disease before their first operation for this complaint. The routine use of this test in individuals suspected of harbouring the hydatid parasite leads to the testing of large numbers of uninfested persons. Including patients with hydatid disease who fail to react, the absence of an immediate response correctly indicates freedom from hydatid infestation in at least 95% of those

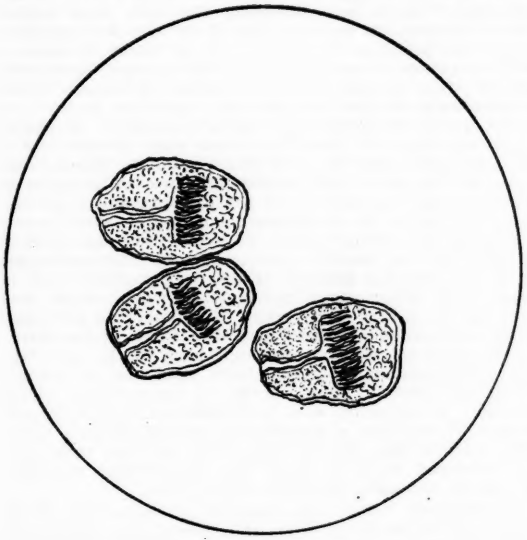

FIGURE II.
Scolex of *Echinococcus granulosus*. × 200.

tested. When there is no history of a recent urticarial rash (indicative of rupture of an hydatid cyst) failure to give an immediate response excludes a ruptured or suppurating cyst, except in those very rare instances in which the cyst fluid possesses no antigenic properties.

The immediate reaction is of diagnostic value only before the first operation for hydatid disease. The reaction may persist for years after operation in the absence of further infestation.

In our experience, symptoms of anaphylactic shock following this test have occurred only in patients tested repeatedly during the post-operative period. These symptoms are readily controlled by the injection of adrenalin.

FIGURE III.
Hooklets of scolices of *Echinococcus granulosus*. × 900.

The Delayed Reaction.

Some hours after the intradermal injection of hydatid fluid an area of erythema with subjacent induration may be found at the site of inoculation. This reaction may fade within twelve, but usually persists for at least twenty-four hours. Intense reactions with vesiculation, local heat, redness and extensive œdema are distinguished from erysipelas or cellulitis by the absence of pyrexia, of general toxæmic symptoms and of glandular enlargement.

The delayed reaction is usually read between eighteen and twenty-four hours after injection. A positive response is characterized by infiltration and œdema in an area at least four centimetres in diameter about the site of injection of the hydatid antigen and an absence of induration in the vicinity of the control injection.

When a delayed reaction is observed, it is necessary to exclude sensitization to host protein, infestation by other helminths and local sensitization resulting from a previous injection of hydatid antigen.

A delayed response to the first test is found before the first operation in less than half of the patients with hydatid infestation. Failure to give this reaction is of no value in excluding the disease, but a positive delayed response under these circumstances indicates the presence of hydatid infestation. It is of no value in the diagnosis of recurrent or residual cysts.

The Complement Fixation Test.

Our experience of the complement fixation test has been derived from the use of the technique advocated by N. Hamilton Fairley. Positive reactions are recorded by the signs "P+", "P++" and "P+++" to denote the fixation by the serum of the patient in the presence of hydatid antigen of three, four and a half and six or more minimal hæmolytic doses of complement respectively.

Positive results are found in from 50% to 60% of those patients with hydatid infestation who are tested before their first operation. Similar figures are found in patients suffering from recurrent or residual cysts a year or more after operation.

The pathological condition of the cyst greatly influences the result of the test. Positive findings are practically invariable in patients in whom the cyst has ruptured or undergone suppuration within the month preceding the test. Two months or more after the onset of these complications, the reaction may have disappeared. In the early stages of degeneration of the cyst, a positive result may be obtained, but when degeneration is complete there will be no reaction. It is more often absent than present in patients with uncomplicated cysts, and the fixation of more than six minimal hæmolytic doses of complement ("P+++" reaction) by the serum of a patient not previously operated on for hydatid disease suggests the presence of some complication such as recent rupture or infection of the cyst.

Any patient whose serum fixes six minimal hæmolytic doses of complement nine months or more after operation, is almost certainly harbouring further active cysts. On the evidence at present available, a persistent "P+" reaction cannot be regarded as diagnostic of residual or fresh infestation until more than two years after operation. However, the occurrence of such a reaction more than nine months after operation should lead to careful investigation for such infestation. If the amount of complement fixed by the serum of the patient is determined towards the end of the second week after operation and again about four and nine months later, valuable evidence is frequently obtained regarding the presence of residual or recurrent cysts.

In our experience this test is specific. Prior to the first operation for hydatid disease a "P++" reaction is diagnostic of hydatid infestation, as is also a "P+" reaction, if confirmed.

In cases of hydatid infestation, the usual cause of failure to react is insufficient absorption of antigen, which may result from complete degeneration or from rupture or suppuration of the cyst a long time before. It is also very frequent with truly uncomplicated cysts. Very occasionally the cyst fluid possesses no antigenic properties. Failure of the serum to react does not exclude echinococcal infestation, either before the first operation for this disease or when the question of residual or recurrent cysts is being considered. The absence of a reaction is, however, valuable evidence in excluding recent rupture or suppuration in a cyst, for in these cases the reaction is almost invariably

positive, the rare exceptions being in those instances in which the cyst fluid possesses no antigenic properties or in which suppuration has occurred in a degenerated cyst.

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Keith D. Fairley,
Physician to Out-Patients, Melbourne Hospital.

British Medical Association News.

SCIENTIFIC.

A meeting of the Section of Ophthalmology of the Victorian Branch of the British Medical Association was held at the Alfred Hospital, Melbourne, on October 12, 1931. The meeting took the form of a series of demonstrations by members of the honorary staff.

Squint.

Dr. T. a'B. Travers discussed the treatment of squint. The usual methods of treatment by glasses were briefly described. The steps taken to prevent *amblyopia ex anopsia* were outlined, namely, occlusion and atropinization of the good eye. Stress was laid on the importance of exercising the squinting eye while the other was occluded. Patients should be made to use the eye as much as possible, by reading, if old enough, by playing with toys and blocks with pictures on them, and sewing cards. A very rapid improvement ensued in some cases, while in others months of occlusion had very little effect. Sometimes, after months of occlusion a pronounced improvement appeared to occur quite suddenly, perhaps within a week. Prolonged occlusion should be tried in all cases of amblyopia, as it appeared at present uncertain how much improvement could be hoped for. An attempt should be made, particularly in the treatment of infants, to prevent the possible development of an abnormal correspondence. This was most easily accomplished by always keeping one eye occluded. The patients should, of course, be closely watched, or *amblyopia ex anopsia* would develop, if one eye was occluded for too long. The aim of the treatment should be to commence fusion training as early as possible. Children could start this usually at the age of four years; the necessary power of concentration was not often possessed by children younger than this. Before training could be commenced the vision in each eye should be good. Ideally, each eye should have an acuity of $^6/_6$. There should not be much difference between the two, and $^6/_{12}$ should be the lower limit of acuity accepted for training. Training could be given when the visual acuity was lower, but in such cases an already tedious process was made more tedious.

Dr. Travers then demonstrated a machine used for fusion training—the synoptophore. This was on the same principle as the Worth amblyoscope, but had certain modifications that made it much more easily manipulated. Various types of slides were shown for developing binocular vision. Dr. Travers remarked that there were three types of binocular vision: Simultaneous macular perception; fusion, or blending of similar image by the two eyes; stereoscopic vision, blending of slightly dissimilar images with a perception of depth. Corresponding types of slides were used in the instrument for these main types of vision.

A brief survey of the technique of fusion training was then given and a *résumé* of methods of treatment. Mention was made of the advantage of combining operation and training. Dr. Travers remarked that this had proved very successful when fusion training alone seemed unlikely to produce a cure in a reasonable time. A method of treatment of abnormal correspondence by prisms was briefly described, but it was not considered to be satisfactory. It was suggested that operation followed by training was the best treatment for abnormal correspondence. Exercises at home included stereoscopic exercises with stereoscopic cards of varying degrees of difficulty, bar reading, and diplopia exercises.

Dr. J. Ringland Anderson gave a brief lecture on the ætiology of squint. He pointed out that binocular vision had been gradually attained by the higher apes and man at the expense of panoramic vision. Animals whose eyes were placed laterally could have very little binocular vision, as there was such a small overlap of the visual fields. As the evolutionary scale was ascended, the eyes were placed further forward. In man the axes of the eyes were parallel, though the position of rest was one of slight divergence. With the extensive overlap of the fields in man, the macula and the power of convergence developed. Binocular vision was gradually evolved and became a survival factor. As such it would only be given up after a struggle. In squint the normal bonds of binocular vision were broken, and it was suggested that the individual's innate unconscious desire for binocular vision could influence the progress of his condition. In some cases the diplopia and confusion that arose from the development of squint would cause suppression of vision to such an extent that the sight of the squinting eye would be practically lost. This *amblyopia ex anopsia* was the greatest of the dangers that arose in squint. In other cases, particularly when squint had developed at a very early stage of infancy, an abnormal retinal correspondence developed—the fovea of the fixing eye corresponded with an eccentric area in the squinting eye. This abnormal correspondence might be so strongly established that a rough form of stereoscopic vision resulted. If operation were performed in such cases and the eye put straight, a paradoxical crossed diplopia would ensue, and as the old eccentric area and the real fovea were engaged in a struggle for superiority, uniocular diplopia or binocular triplopia might arise.

Dr. Anderson briefly described the investigation of the suppression of squinting eyes, and showed how the field of vision of the squinting eye was not suppressed over its whole area, but only in those places where, presumably, vision would cause confusion to the impulses arising in the fixing macula.

Detachment of the Retina.

Dr. Anderson also gave a lecture demonstration on detachment of the retina. He briefly described Gonin's theories and his methods of localizing tears in the retina. A series of patients were shown who had been affected with different types of tears. Some of these had been cured by operation. Holes in the detached retina might be of various types. Patients were shown who had either small retinal holes, or splits, or a tear near the *ora serrata* (a disinsertion or anterior dialysis of the retina). Dr. Anderson discussed methods of treatment in all these types of cases, and showed how the operation must be carefully planned so that cauterization might give the best results.

Dr. Anderson and Dr. Travers were assisted in their demonstrations by Mrs. Southey and Misses Cumming, Fox and Bryant.

NOMINATIONS AND ELECTIONS.

The undermentioned has been nominated for election as a member of the New South Wales Branch of the British Medical Association:

Accola, James Bernard, M.B., B.S., 1929 (Univ. Sydney), Sydney Hospital, Sydney.

Medical Societies.

PUBLIC MEDICAL OFFICERS' ASSOCIATION OF NEW SOUTH WALES.

The sixth annual general meeting of the Public Medical Officers' Association of New South Wales was held at the British Medical Association House, 135, Macquarie Street,

Sydney, on January 28, 1932, DR. KENNETH SMITH, the President, in the chair.

Annual Report.

DR. H. HASTINGS WILLIS, the Honorary Secretary, presented the report for the year 1931, which was adopted. It read as follows:

1. The continuance of the industrial depression in Australia during the year 1931 has obliged the Association to pursue its defensive policy of the previous year. No effort has been made to seek benefits, but our endeavour has been to retain those already gained. While there are good reasons why public servants, being prevented from benefiting by good times, should not be obliged to share sacrifices in bad times, it is thought that the conditions of recent years have been so unusual and the sacrifices necessarily borne by some citizens so great that protest against salary deductions imposed by Parliament would have been not only ineffectual but imprudent.

2. The Committee met twelve times during the year, the attendances of members being as follow: Dr. Kenneth Smith (President), 12; Dr. Chas. Badham, 12; Dr. M. R. Finlayson, 10; Dr. S. Evan Jones, 11; Dr. E. L. Morgan, 8; Dr. A. E. Machin, 8; Dr. Dorothy McClemens, 7; Dr. H. H. Nowland, 9; Dr. J. S. Purdy, 4; and Dr. H. Hastings Willis (Secretary), 12. Dr. Morgan was absent on leave for portion of the year.

3. The number of members on the roll of the Association at the end of the year was 79. A few eligible medical officers have not yet joined us.

4. It is regretted that the Committee's attempts during the year to secure closer relationship with the British Medical Association have been unsuccessful. Our request for direct representation of public medical officers on the proposed Federal Council of the British Medical Association in Australia has been refused, and in view of the continued opposition in certain quarters our request of former years for similar representation on the Council of the New South Wales Branch has not been repeated. It is hoped that in future an opportunity may occur of prosecuting this matter further, as it is considered very desirable that our relationship with the British Medical Association should be as close as possible.

No changes have occurred in our relations with other service organizations. It is understood that certain scientific and technical officers in the New South Wales Public Service contemplate an agitation to secure greater recognition of their special qualifications when salaries are being determined. Such a movement deserves sympathy and support from our members.

5. Six circulars have been distributed to members during the year to keep them in touch with the Association's activities.

6. The annual social function took the form of a motor picnic to Avalon Beach on Saturday, October 24, 1931. The small attendance of only five car parties is to be regretted, as this function serves a very useful purpose in furthering the objects of the Association. The weather was fine and a pleasant day was spent by those members and their families who were present.

7. The Association's agreement with the New South Wales Public Service Board expired on June 30, 1931, but after negotiation was continued with the rectification of some anomalies for a further period of two years. The creation of several new positions since the agreement was first drawn up has resulted in some of our members in the New South Wales service not being covered by it. A request to bring these positions within the scope of the agreement was refused by the Public Service Board, and it must be the duty of the Committee to see that the interests of the members concerned will not be prejudiced thereby.

All members of the Association in both Federal and State services, along with other public servants, have been subjected to salary deductions averaging about 20% during the year by parliamentary enactments as part of a scheme of national economy.

8. The difficulty which will be experienced in securing increases in salaries during the next few years makes it very necessary that our members should enjoy good prospects of promotion within the services.

9. For the greater part of the year the Committee's attention has been devoted to a consideration of the Association's relationship to the industrial tribunals of New South Wales. This has been necessary because of the New South Wales Government's declared policy of compulsory unionism for its servants and to meet certain contingencies should projected industrial legislation be passed by the New South Wales Parliament. After much consideration and after taking legal advice, the Committee considers it advantageous to register the Association as a trades union under the law of New South Wales, and for this purpose certain proposals for alterations of the rules of the Association to comply with the *Trades Unions Act* of 1881 will be submitted at the annual general meeting of 1932. This submission will afford members the opportunity of themselves deciding the Association's policy on this matter.

10. Though fully conscious of the desirability of enhancing the prestige of the Association and its members, the Committee has been unable to formulate specific proposals with that object in view.

11. Circumstances continue to be unfavourable for starting a journal of the Association. Early in the year it was suggested that a page of THE MEDICAL JOURNAL OF AUSTRALIA should be devoted periodically to items of special interest to public medical officers, but in view of the reduced size of that journal, the Editor found the proposal impracticable.

12. This report marks the termination of the first five years of the Association's existence. The Committee has during this period discouraged proposals to alter the rules or financial arrangements of the Association, but it is of opinion that effluxion of time and the very changed conditions of the present day make some alterations now desirable. It is understood that certain proposals for extending the membership of the Association, for reducing the annual subscription and for altering the organization of the Association to comply with the industrial laws of New South Wales will be placed before the annual meeting of 1932, all of which the Committee commends to members for their earnest consideration.

Financial Statement.

DR. E. L. MORGAN, the Honorary Treasurer, presented the annual financial statement, which showed an income for the year 1931 of £90 10s. 6d., and an expenditure of £16 15s. 8d. The accumulated funds of the Association now total £348 6s. 11d.

Election of Office-Bearers.

The office-bearers for the ensuing year are as follows:

President: Professor Harvey Sutton.
Honorary Secretary: Dr. H. Hastings Willis.
Honorary Treasurer: Dr. E. L. Morgan.
Honorary Auditor: Dr. Elsie J. Dalyell.
Members of Committee: Dr. R J. Millard, Dr. C. Badham, Dr. E. L. Morgan (Health Department), Dr. S. Evan Jones, Dr. H. H. Nowland (Mental Hospitals), Dr. Dorothy McClemens, Dr. A. E. Machin (Education Department), Dr. M. R. Finlayson (Works and Railways), and Dr. H. H. Willis (Repatriation Department).

Policy of the Association.

Several motions were submitted to the meeting with the object of altering the Rules of the Association so as to extend the membership, reduce the annual subscription, and render the Association eligible for registration as a trade union. These provoked considerable discussion. It was decided to extend membership to part-time salaried medical officers, but to enrol them in existing groups without special representation on the committee, to increase the entrance fee to ten shillings and reduce the annual subscription to five shillings. It was decided not to alter the rules objected to by the Registrar of Trade

Unions. A motion directing the Committee to request the Government of New South Wales to recognize membership of the Association as equivalent to membership of a trade union was lost.

The meeting ended with a vote of thanks to Dr. Kenneth Smith for his services during the past year as President. The motion was carried with acclamation.

Correspondence.

TRAUMA AND ORGANIC VISCERAL DISEASE.

SIR: Dr. Fry's letter in your issue of February 6 is much fuller than his first, but if he has not been persuaded, neither have I.

Dr. Fry says in his second paragraph that the abdominal contents, taken as a whole, can be compared roughly to a colloidal mass on a gigantic scale and conform approximately to the hydrostatic and hydrodynamic laws of a viscous fluid, but in a distinctly limited manner.

The comparison Dr. Fry would make is between two things that are not rationally comparable. One has to cut out practically all the characteristics of a colloid mass before one can begin to think of making an analogy. No sound deductions can be made on such a frail foundation.

In the next paragraph, referring to the abdomen, Dr. Fry writes: "Definite departures from the normal physical reactions of a true fluid are exemplified by: (i) The absence in the normal abdomen of the transmission of a wave of percussion, a phenomenon which does appear in the presence of ascites. (ii) The fact that a rupture of the limit wall of the abdominal cavity is not invariably the first effect, if any, of violence impressed upon the abdomen from without."

This is all so astonishingly wrong that one pauses at first in amazement. We all forget at times, and may slip into error, and Dr. Fry could hardly have written it except in such a moment.

Dr. Fry writes unequivocally as if, to him, "true fluid" meant liquid, and liquid only.

If we set ourselves to describe the physical properties of a gas, one of the first things we remark is that it is a fluid. A liquid is also fluid, but differs in other physical properties. One property in which a gas and a liquid differ is that the former will always distribute itself so as to fill a containing vessel, while a liquid of certain volume introduced into a containing vessel of larger volume will occupy only a portion of the vessel equal to its own volume. Next, a gas is compressible and obeys Boyle's law, while a liquid is incompressible. Again, a liquid, being incompressible (or nearly so), can transmit a surface wave when percussed under such circumstances that gravity, as in a lake, or an elastic pressure, as in the arteries or in ascitic fluid, provides a force of restitution.

And "the fact that a rupture of the limit wall of the abdominal cavity is not invariably the first effect, if any, of violence impressed upon the abdomen from without" is not due to any "departure from the normal physical reactions of a true fluid". It is due principally to the fact that the fluid it contains happens to be nearly all in the physical state of a gas, obeying the physical laws of gases, including Boyle's law, and not an incompressible fluid, such as a liquid is. If it were liquid, the abdomen would burst like a squeezed bladder.

Dr. Fry's dificulties vanish at once when a gas is recognized to be "true fluid". That false premise of his nullifies and collapses the edifice of argument founded on it, and consequently his fourth paragraph, beginning "Therefore . . . ", and embodying the fallacious conclusion, can be rejected without further words.

In his fifth paragraph he takes this fallacious conclusion of his as proved, and applies it, with the result that he is able to say, "I fail to see, therefore, that Boyle's law has any general application to intraabdominal conditions". But, of course, if his previous conclusion is fallacious, his application of it is fallacious and his proofs no good. We cannot agree that he has proved that Boyle's law is inapplicable.

Taking up now the sixth paragraph, I note that in his view I have essayed to prove a negative proposition, that simple muscular exertion cannot cause intraabdominal trauma. I prefer to state it another way. I questioned the correctness of an assertion that had been put forward without evidence, namely, that muscular exertion causes increased peristalsis. To refuse to believe without reasonable proof is not an essay to prove a negative. In my second paper, if I know myself, I had no bias to prove or disprove anything. I had reasoned the subject out quite coldly, and as the result I formed an opinion. Certain assertions conflicting with this, but put forward *ex cathedra*, and without reason given, stirred me to write an analysis of the question for publication, as it did not seem to have been done by anyone before. The fundamental fact governing the issue was the existence and effect of Boyle's law. I argued that Boyle's law controlled the sequence of events under changes of gas pressure just as much in the hollow viscera as it did elsewhere. That is not a negative proposition, it is a positive proposition. On the other hand, Dr. Fry's denial that Boyle's law has any general application to intraabdominal conditions is the negative of this, and he has attempted to prove this negative proposition.

Dr. Fry in the same paragraph reminds us that he had contended that muscular effort might lead to a sudden alteration in the shape of the abdominal cavity necessitating a sudden redistribution of the viscera in that cavity, whereby there might be made to appear a momentarily uncompensated force sufficient to rupture diseased tissue, and, he adds, internal herniation. Then he mentions some conditions in which such a development might occur. I have not discussed internal hernia at all, and there is no space for it here, so I proceed to the question of alterations in shape.

We meet with an initial difficulty in the connotation of the term "sudden". Every movement of body or limbs, however rapid, takes time. When we flex the elbow, it takes a period of time to bring the hand up to the shoulder. The rate may vary, but a diagram on squared paper would always show the line from zero to peak as a slope, not a vertical line, as it would with an instantaneous occurrence. Just so when we bend the body. It takes time to approximate the ribs to the pelvis, and it therefore takes time to change the volume or shape of the abdominal cavity. Again, it takes time for the diaphragm to contract in inspiration, and it takes time for the relaxed diaphragm to be pushed up again by the intraabdominal hydrostatic pressure. There is nothing like an instantaneous effect. Further, there is a rhythmic change in volume and pressure in the abdominal cavity corresponding to the frequency and depth of respiration, and there must accompany it a mass movement of particles from locus *a* to locus *b* and back again. Other changes of volume and pressure in the abdominal cavity may cause similar mass movements of rearrangement. But even if the word "sudden" is used, it can have only a relative meaning. It could only mean "relatively rapid as compared with the commoner movements". The "suddenest" movement takes time.

Following on this, let me observe that, even if there are peristaltic contractions, there is nothing to prevent us, in the present connexion, from considering the abdominal cavity as practically one space, for, as I noted in my second paper of November 7, the only sort of rigidity possessed by the gastro-intestinal tract is that developed by the hydrostatic pressure of its contents against the wall of the viscus. That is the sort of rigidity developed by the pressure in a hose-pipe, whether its contents be gas or liquid, and it is the same sort of rigidity that is developed by erectile tissue in the animal body.

The hindrance to adjustment of hydrostatic pressure within what is practically one space is negligible.

In conclusion, let me thank Dr. Fry for the stimulating criticism which has raised so many important points.

Last of all, let me apologize for being so long, but these matters are important, and I believe many readers will find them even interesting.

Yours, etc.,

C. E. CORLETTE.

Sydney,
February 13, 1932.

ORALLY ADMINISTERED INSULIN.

SIR: Dr. A. R. Southward speaks for all who attempt to treat diabetes in a scientific manner, when he condemns the oral use of certain alleged substitutes for insulin. The energetic manner in which such preparations are constantly brought before the notice of members of our profession needs no further mention. Constant dripping will wear away a stone. Constant bombardment with advertisements and circulars may break down the rational scepticism of some of our colleagues, to the ultimate detriment of their patients' welfare.

It is, of course, obvious that no journal can be responsible for the truth of any statement made in its advertisement column. It is, nevertheless, equally true that the appearance of any advertisement in the columns of an official organ, such as our own journal, gives a certain cachet to the product advertised. This was quite clearly recognized by the editor of *The British Medical Journal* some three years ago. A letter appeared in the columns of that journal, signed by the chiefs of most of the diabetic clinics in London, condemning the publication of an advertisement for an oral substitute for insulin. The offending advertisement disappeared forthwith. Would it be too much to ask, in the interests of rational therapeutics, that in similar cases our own journal should act similarly.

Yours, etc.,

BRUCE HUNT.

Perth,
Western Australia,
February 19, 1932.

TWO INTERESTING CASES.

SIR: I crave space in your columns to report two cases which, I think, are of interest clinically.

Miss E.H., aged seventeen, a professional *danseuse*, whilst rehearsing a "stunt" at 11.30 a.m., was seized with severe pain all over the abdomen, causing an urgent desire to urinate. Emptying of her bladder gave her no relief, and an infraumbilical pain persisted, despite vomiting, until I saw her at 6 p.m. Her tenderness was most marked in the right iliac fossa. She was a *virgo intacta*, and *per vaginam* examination was not made. *Per rectum* examination revealed nil. Temperature was 98° F., pulse 80. There was no rigidity, hyperæsthesia or extension into groin or lumbar regions, no hæmaturia or constipation; and enema gave no relief. Periods were due on the day following the seizure, and were quite regular.

I candidly admit I considered she had appendicitis, but as there were no symptoms or signs to warrant interference, I left her for six hours. Her temperature was then 99° F., pulse 88, and she looked ill. I decided to "look and see". I removed a perfectly normal appendix, and examination of her pelvis revealed at least one and a half pints of bright blood clotted, with a bleeding point on the left ovary. This I felt sure to be hæmorrhage from a ruptured Graafian follicle. Usual operation performed as for an ovarian pregnancy, and her recovery was rapid. Dr. Keith Inglis kindly examined the specimen removed and reported a normal Graafian follicle.

The interest lies clinically in the amount of blood lost, with the absence of increased pulse rate twelve hours after its occurrence, and medico-legally from the fact that a girl about to menstruate was injured whilst following her occupation.

My other case was only met with today. Some of my colleagues who have been doing urgent cases longer than I have, may have met a similar one.

J.B., aged twenty, reported to out-patients this morning, complaining of pain, gradual in onset, in the right iliac fossa three days previously, and gradually getting worse. Temperature was 98·4° F., pulse 76. There was tenderness in the right iliac fossa, nowhere else, no vomiting, no intestinal or urinary symptoms. He was told to go home to bed and return if he got worse. He returned eight hours later, and when I saw him his temperature was normal, pulse 76, but marked tenderness over McBurney's and nowhere else. I diagnosed appendicitis with some misgivings, because he should have been worse or better at this stage (three and a half days from the onset). At operation I found the distal half of the appendix red and swollen and perforating the peritoneal coat and projecting into the peritoneal cavity half an inch was a very ordinary pin. On interrogating his parents I learned that he swallowed two pins whilst at his work seven days ago. I shall ray him to see if the other pin is still meandering in his intestinal tract, and will X ray his removed appendix for the same reason.

After reading Dr. Feather's report on wheat in the appendix, I thought this case might be of interest.

Yours, etc.,

A. P. GUNNING,
Honorary Assistant Surgeon, Mater Misericordiæ Hospital, North Sydney.

December 29, 1931.

Obituary.

GILBERT MILLER TEAGUE.

DR. GILBERT MILLER TEAGUE, whose death occurred at Armadale, Victoria, on January 9, 1932, was born at 89, Collins Street, Melbourne, in September, 1870. His father, James Pascoe Teague, practised at 89, Collins Street for fifty-four years. Gilbert Miller Teague was sent to Melbourne Grammar School. He excelled at sport. He held the championship for athletics among the boys under fifteen and under sixteen. He rowed for his school, played football, and was a member of the cadet corps. He studied medicine for two years at the University of Melbourne, and continued his interest in sport. He won the three-mile race. He then went to Edinburgh, where he qualified. He was a successful student, winning a gold medal for anatomy in Macdonald Brown's class, and a medal for midwifery and diseases of women in Haig Ferguson's class. After graduation he received an appointment at the Sheffield Infirmary. He came to Australia to an appointment at the Homœopathic Hospital, Melbourne, and later held hospital appointments in New South Wales and Queensland. On the outbreak of the Boer War he offered his services in Brisbane, but they were not accepted. He then accepted an appointment in Western Australia, and after five years returned to Victoria and practised for sixteen years in Coleraine and Hamilton. In 1915 he volunteered for service with the Australian Army Medical Corps and served in Egypt and at Dartford, England. He returned to Australia in 1917 on account of ill-health, and practised later at Oakleigh. There he became ill, but his health improved with treatment. He went back to Queensland and stayed till 1931, when he returned to Melbourne for what he thought would be a minor surgical operation. He found, however, that his condition was serious, and faced the knowledge that his life's work was done with the same courage that he had always displayed from his school days onwards. He is survived by his wife, two sons and three daughters.

Dr. S. C. Fitzpatrick writes:

I have reason to remember Gilbert Teague with gratitude and appreciation during the few years I knew him as a colleague in general practice. His example was stimulating and thought-provoking in many respects. His bent was in the direction of the teacher rather than of the practitioner. Professionally, he worked hard to establish his diagnoses, and equally keenly to perfect his lines of treat-

ment. He stressed the treatment of his patients as individuals rather than as cases.

His literary ability, fund of anecdote, facility as a *raconteur*, and his genial personality made him an enjoyable companion.

HUBERT JAMES ORR.

WE regret to announce the death of Dr. Hubert James Orr, which occurred on February 22, 1932, at Launceston, Tasmania.

Books Received.

THE NEURAL ENERGY CONSTANT, A STUDY OF THE BASES OF CONSCIOUSNESS, by J. Bostock, M.B., B.S., D.P.M., M.R.C.S., L.R.C.P.; 1931. London: George Allen and Unwin. Demy 8vo., pp. 196, with illustrations. Price: 6s. net.

INTERNATIONAL STUDIES ON THE RELATION BETWEEN THE PRIVATE AND OFFICIAL PRACTICE OF MEDICINE, WITH SPECIAL REFERENCE TO THE PREVENTION OF DISEASE, conducted for the Milbank Memorial Fund, by Sir Arthur Newsholme, K.C.B., M.D., F.R.C.P.; Volume III; 1931. London: George Allen and Unwin Limited. Demy 8vo., pp. 558. Price: 21s. net.

BLOOD PRESSURE, A MANUAL FOR NURSES, HYGIENISTS AND SOCIAL WORKERS, by J. F. Halls Dally, M.A., M.D., B.Chir., M.R.C.P.; 1931. London: Faber and Faber. Crown 8vo., pp. 116, with illustrations. Price: 3s. 6d. net.

Diary for the Month.

MAR. 7.—New South Wales Branch, B.M.A.: Organization and Science Committee.
MAR. 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
MAR. 11.—Queensland Branch, B.M.A.: Council.
MAR. 15.—New South Wales Branch, B.M.A.: Medical Politics Committee.
MAR. 23.—Victorian Branch, B.M.A.: Council.
MAR. 29.—New South Wales Branch, B.M.A.: Council (Quarterly).
MAR. 31.—South Australian Branch, B.M.A.: Branch.
MAR. 31.—New South Wales Branch, B.M.A.: Annual Meeting.
APR. 1.—Queensland Branch, B.M.A.: Branch.
APR. 5.—New South Wales Branch, B.M.A.: Council (Election of Officers and Standing Committees).

Medical Appointments.

Dr. E. Mansfield (B.M.A.) has been appointed to act temporarily at the port of Cairns, Queensland, as Medical Inspector of Seamen, for the purposes of the *Navigation Act*, 1912-1926.

* * *

Dr. A. B. Carvosso (B.M.A.) has been appointed Acting Government Medical Officer at Brisbane, Acting Visiting Surgeon to the Brisbane Prison and Saint Helena Penal Establishment, and Acting Visiting Medical Officer to the Diamantina Receiving Depôt and Infants' Home, Wooloowin, Queensland.

* * *

Dr. V. P. Johnson (B.M.A.) has been appointed Acting Medical Superintendent of the Hospital for the Insane and the Receiving House, Ballarat, Victoria, pursuant to the provisions of the *Lunacy Act*, 1928.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xvi.

ALFRED HOSPITAL, PRAHRAN, VICTORIA: Medical Officers.
MATER CHILDREN'S HOSPITAL, BRISBANE, QUEENSLAND: House Physician, House Surgeon.
TOOWOOMBA HOSPITALS BOARD, QUEENSLAND: Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associated Friendly Societies' Medical Institute. Mount Isa Mines. Toowoomba Associated Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

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